**MARKING SCHEME BIOLOGY \_end of term 3\_SENIOR FIVE**

1 a) A community is a group of individuals of different species while a population is a group of individuals of the same species. **(2 marks)**

b) Abiotic factors are non-living components of an ecosystem including temperature, soil, water while biotic factors are the living components of an ecosystem including plants and animals. **(2 marks)**

c) Ecosystem is a natural unit composed of abiotic and biotic factors whose interactions lead to a self-sustaining system while an ecological niche is apposition that an organism occupies in a habitat, this includes the physical space where an organism is found and its role in that habitat in terms of feeding relationships and other interactions with other species. **(2 marks)**

2) –Boring devices to enter the host

-Attachment organs such as hooks and suckers

- Outer covering resistant to attack by host enzymes

-Highly specialized mouth parts

-Reduction of sense organs

- Anticoagulant production in blood feeders

-Chemo sensitivity in order to reach the optimum location in the body

-Hermaphrodite condition allowing self fertilization

-use of secondary hosts as vectors

**(5 marks)**

3

|  |  |  |  |
| --- | --- | --- | --- |
| **Process** | **Uses energy in the form of ATP** | **Uses protein** | **Controllable by cells** |
| Diffusion | x | x | x |
| Osmosis | x | x | x |
| Facilitated diffusion | x | √ | √ |
| Active transport | √ | √ | √ |
| Endocytosis and exocytosis | √ | x | √ |

4) An amoeba is very small, so has large surface area to volume ratio. All amoeba cell contents are close to the oxygen supply in the surrounding water and so diffusion is sufficient for its needs. **2 marks**

5 a) The sugar molecule is the same in nucleic acid and polymer for all constituent nucleotides. One type of polymer contains deoxyribose the other ribose. This makes it easy to distinguish the two types. **2 marks**

b) Complementary strand sequence: T A A T C C G A TA **2 marks**

C) 20% A; 30% C; 30% G **2marks**

6) **Differences**

|  |  |  |
| --- | --- | --- |
|  | **RNA** | **DNA** |
| Strand | Single strand | Double strand |
| Sugar | Ribose | Deoxyribose |
| Size | Small | Big |
| Location | Cytoplasm | Nucleus |
| Type | 3 types | One type |
| Specific base | Uracil | Thymine |

**3 marks**

**Similarities**

Both have bases AC and G

Both are instructional molecules carrying codes

Both are made by nucleotides

**3 marks**

7 a) A codon is a group of triple bases that are found **mRNA** and they code for amino acids whereas an anticodon is a group of triple bases found on **tRNA,** they are complementary to the codon on **mRNA.**

b) (i) It is universal because it is the same in all living organisms. **1 mark**

(ii) It is degenerative because most of amino acids have more than one code

**1 mark**

(iii) It is overlapping because each base in the sequence is only read once.

**1 mark**

**8** a) **-**Ribulose biophosphate (RUBP)

- Ribulose biosphate carboxylase and

- Glycerate 3-Phosphate

9 a) In the light-dependent reaction, electrons energized by light are used to generate ATP and NADH; these compounds provide energy for the formation carbohydrates during the Carbon fixation reaction. **4 marks**

b) Photosynthesis is ultimate source of all chemical energy and organic molecules available to photoautotrophs, such as plants and to all organisms as well. **2 marks**

10 a) Because the tobacco contains nicotine which is an addictive substance

that conditions the brain to work properly when it is present. **2 marks**

b) -Monitor tobacco use and prevention policies

- Protect people from tobacco use

- Offer help to quit tobacco use

- Warn about the dangers of tobacco

- Raise taxes on tobacco **2 marks**

11 a) Body temperature does not fluctuate as much as that of the environment this allows humans to live in different places. Too low temperatures would denature the enzymes and disrupt the balance of substances produced during metabolism. **2 marks**

b) Hypothalamus has temperature receptors, measures blood temperature, contain both heat again and loss centres, coordinates the responses. **2 marks**

c**)** High concentration of glucose leads to increase of insulin which lowers the blood sugar by favouring the glycogenesis. **2 marks**

12 a) Nucleus **1 mark**

b) Identical twins have exactly the same genes so must be the same sex and result from a single fertilized egg. **3 marks**

c) -Clones have exactly the same genes as the parent, so any genetic defect will be present in all clones and will be equally susceptible to disease. So, one epidemic could wipe out entire population.

-Cloning is technically difficult and expensive. **4 marks**

13 a) –The resistance of Mosquitoes to insecticide

-The difficulty of controlling the bleeding of mosquitoes because they

lay eggs in small bodies of water.

-Resistances of some trains of malaria parasites to anti-malarial drugs such as chloroquine. **3 marks**

b) Refugees rarely have access to proper sanitation, clean water

-Contaminated food. **2 marks**

**SECTION B**

14 a) (i) A localized group of several populations of different species interacting

with one another and physical/chemical factors of environment.

**1 mark**

(ii) a localized group of communities and their physical environment **1 mark**

(iii) A series of stages through which energy passes, always beginning

with chemical energy incorporated in plant tissues. **1 mark**

b) Food webs give a more accurate picture of natural feeding relationships. It is

extremely rare to have linear food chains because few animals confine

themselves to a single type of food and few plants serve as the only food for

one type of herbivore. **3 marks**

c) Not all the stored chemical energy is transferred to the herbivores, proportion seems surprisingly low; similar wastage occurs between subsequent stages of the food chains.

All organisms of food chain will lose energy as heat during respiration, faeces, excretory matter; through decay when they die. **4 marks**

15) **Pathways** (Consider the following points)

-Apoplast pathway

-Symplast pathway

-Vacuolar pathway

-Endodermis/casparian strip

-Pericycle secrets into Xylem to lower water potential in the xylem

-Water into xylem vessels.

**5 marks**

**Mechanisms**

-Cohesion of water molecules/tension theory

-Adhesion of water molecules to walls of the xylem

-Walls lined with cellulose; water molecules held with hydrogen bonds

-Water drawn up xylem vessels in continuous column by transpiration pull

-Evaporation from the surface of mesophyll cells by osmosis.

**5 marks**

**16) Insulin**

-Influences conversion of glucose to CO2 +H2O

-Influences conversion of glucose to glycogen

-Influences conversion of glucose to fats

-Influences the formation of ATP. RNA, DNA

**Deficiency**

-Results into hyperglycaemia

-breakdown of muscle tissue

-Loss of weight

-Tiredness

**Excess**

-Hypoglycaemia

-Hunger

-Sweating

-Irritability and double vision

**10 marks**

17) Has both positive and negative effects that is why it is said to be a necessity at the same time an evil.

**Positive effects**

-Absorption and transport of sap

-Cooling effect

-Provides the plant with essential nutrients

-Increases the relative humidity of the dry atmosphere

-Brings about the opening and closing of stomata.

**Negative effects**

-Loss of turgor and wilting

-May cause death of plant

-may cause reduced growth rate

-takes place along the gaseous exchange route which is essential for photosynthesis and respiration

18 a) Mitosis is a type of cell division in which the cell divides into two daughter cells each having exactly the same number of chromosomes as the parent cell.

**2 marks**

b) –Growth and development of living organisms.

Since Mitosis produces daughter cells which are exact duplicates of parent cells, then it enables a tissue to extend by formation of new cells which are identical to the pre-existing cells.

-Replacement of worn out cells. Mitosis allows worn out cells to be replaced by exact copies of the original cells.

-Asexual reproduction. Mitosis is the basis of asexual reproduction in organisms. Example: in binary fission as in amoeba.

-Genetic stability. Mitosis produces two daughter cells which have the same number of chromosomes as the parent cell.

Thus the daughter cells are genetically identical to the parent cell. Therefore, no genetic variation occurs during mitosis.

**8 marks**

**(2 marks)**

4 a) A C E D B **(1 mark)**

b) Centromeres have divided, chromosomes pulled a part/moved/migrated to

opposite poles.  **(2 marks)**

c) DNA synthesis/ replication ie DNA doubles making it enough for daughter

cells. **(3 marks)**

5 a) Stroma of chloroplast.  **(1 mark)**

b) CO2 combine with 5 C compound RUDP to form unstable 6C compound

with enzyme RUBISCO. **(2 marks)**

c) Products are NADPH2 and ATP. ATP is the source of energy and NADPH2  is used to reduce GP to triose phosphate and ATP is used to regenerate RUBP.

**(2 marks)**

6) - Disappearance of Substrate: Iodine in Potassium iodide solution

(**reject iodine only**) **(2 marks)**

- Appearance of product: Benedict’s solution/reagent **(2 marks)**

7 a) Hydrophilic/soluble, folded into spherical shape and is metabolically

active. **(2 marks)**

b) Iron needed for Haem group of Haemoglobin. They have less Haemoglobin and therefore less oxygen transported, respiration is low. **(2 marks)**

1. a)

- Increases heart rate

- Constricts arteries

- Reduces blood flow to periphery parts

- Increases stickness **(2 marks)**

b) -Smoke/tar is carcinogenic/contains carcinogen

- Causes DNA mutation

- Causes uncontrolled cell division/mitosis

- Cancer cells do not respond to signals **(2 marks)**

9 a) Both alleles in a heterozygous organism are dominant and are fully expressed in the phenotype. A is not dominant to B or vice versa. Both being expressed. **(2 marks)**

b) Son receives Y chromosomes from father Y does not carry haemophilia allele. Father will pass haemophilia alleles to daughter who will pass allele to her son who are his grandson.

**(2 marks)**

10 a) - Oestrogen : Follicle cells/granulosa/theca

-Progesterone: Corpus Luteum. **(2 marks)**

b) -Mostly secreted during the second half of the cycle.

-Maintains the lining of the Uterus in preparation for implantation,

- Inhibits secretion of FSH and LH. **(3 marks)**

11 a) (i) Palmitic acid has more hydrogen per mole needed for ATP

production during oxidative phosphorylation. **(2 marks)**

(ii) Alanine: Starvation

Lactate: After anaerobic respiration  **(2 marks)**

b) –Oxidative phosphorylation

-Final electron acceptor

- Reduced to water.

-Increases ATP production **any two: (2 marks)**

12 (i) Protein molecules are too large to pass through the basement

membrane. **(2 marks)**

(ii) Glucose is reabsorbed into the blood from the filtrate in the

proximal convoluted tubule. **(2 marks)**

(iii) There is higher concentration of urea in the urine than in the

filtrate because water is reabsorbed from the filtrate in the distal

convoluted tubule leaving most of the urea to pass out of the

body in the urine. **(2 marks)**

13) Catalyst, Globular, Active site, Activation energy **(4 marks)**

14 a) - Avoid unintended pregnancy

* Give mother time to work, feed well her child because child must breastfeed at least 1000 days
* Women can plan and space their pregnancy
* Lead to better education, more job opportunities and economic security

**(2 marks)**

b) - Freedom from threat of STI and HIV

- No physical side effect

- No cost involved

-No need to visit health care providers. **(2 marks)**

15 a) A biological community and the physical environment associated

with it. Nutrients pass between the different organisms in an

ecosystem in a definite pathways form soils to plants to

herbivores to carnivores. **(3 marks)**

b) These big Fierce animals are in the top levels in food chain.

Energy is lost at every trophic level. They don’t get enough energy

to maintain them. Need large habitat which are difficult to find

and defend. Competition and other environmental resistance

could have killed them. **(3 marks)**

16 a) (i) Causes mainly linked to habits during life of a person/results of

choices made by an individual person. **(2 marks)**

b) -Pathogen: Virus

-Transmission: Aerosol infection or droplet ie from infected to

uninfected. **(2 marks)**

**SECTION B**

17) Liver is the Largest internal organ in the body. Liver performs various

functions in the body including glucose metabolism. The level of glucose in

blood depends upon the level of mental and physical activity. It is against

these changes in supply and demand that three main hormones, Insulin,

glucagon and blood glucose level. In case of a decrease, glycogen is broken

down under the influence of glucagon and adrenaline hormones to glucose-

6-phosphate and in case of excess especially after a meal of carbohydrate,

glucose is converted to glycogen for storage in the Liver and Muscles.

**(10 marks)**

18) Include all possible ways involved in the control of Malaria parasites.

These include:

- Destroy the breeding ground ie:

* Clear stagnant water
* Cover stagnant water with oil to suffocate the mosquito larva
* Clear all the bushes around homes

- Sleep under mosquito net

- Close windows early enough in evening

- Spray insecticide before going to sleep

- Use malarial drugs to treat the sick

**(10 marks)**

19 a) Refers to the preservation of Natural resources for sustainable use

overtime. **(2 marks)**

b) Forests can be conserved in the following ways:

* Re-afforestation
* Afforestation
* Selective feeling of trees
* Protecting forest from fires, pests and disease
* Overgrazing of forest floor should be discouraged
* Educating the masses about importance of forests
* Government to set up Laws preventing destruction of forests
* Use alternative sources of energy in homes such as biogas to replace firewood
* Set up forest reserves

**(8 marks)**

20) The amount of water in the body is regulated by the kidneys under

the control of hypothalamus. When water level in blood is low the

blood is too concentrated. The nervous and endocrine

systems are stimulated. The Hypothalamus gland detects this

and stimulates pituitary gland to release ADH into blood stream.

The ADH causes Kidney tubules to reabsorb more water back into

blood. It makes the tubules to be more permeable to water. When

the level water is high the release of ADH is stopped/suppressed

water goes out with urea in form of urine.

**(10 marks)**

21 a) - Dumping of industrial wastes such as lead into water bodies

* Dumping domestic wastes such as detergents into water
* Release of hot water from industries into river
* Dumping untreated waste (sewage) into water
* Excess use of fertilizers and herbicides
* Dumping Petroleum products e.g oil into water

**(5 marks)**

b) - Death of aquatic organisms

- Eutrophication ie excess growth of algae in water. This

reduces light and oxygen entry into water

- Toxicity by non-biodegradable pesticides killing organisms

- Water bone diseases such as cholera and dysentry.

**(5 marks)**