**NAME:…………………………………………….…………INDEX………………..…..DATE……..**

**SCHOOL………………………………………………SIGNATURE………………………………**

231/2

BIOLOGY

PAPER2

MARCH, 2016

2 HOURS

**JITEGEMEA HIGH SCHOOL**

**Kenya Certificate of Secondary Education 2010**

231/2

BIOLOGY

PAPER2

MARCH 2016

**INSTRUCTIONS TO CANDIDATES**

* *This paper consists of* ***TWO*** *sections A and B*
* *Answer* ***ALL*** *the questions in section A in the spaces provided*
* *In section B answer question* ***6 (compulsory)*** *and either question 7 or 8 in the spaces provided after question 8*

**For Examiner’s Use Only**

|  |  |  |  |
| --- | --- | --- | --- |
| **Section**  | **Question** | **Maximum Score** | **Candidates’ Score** |
| A | 12345 | 88888 |  |
| B | 678 | 202020 |  |
| **80** |  |

**SECTION A** *Answer* ***ALL*** *questions in the spaces provided*

1. (a) (i) Name the structure of the plant where translocation takes place (1 mk)

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 (ii) State three structural adaptations of the part named above (3 mks)

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(b) Explain the movement of water from the soil until it reaches the root xylem (4 mks)

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1. The structure below is found in the members of a class in the kingdom Animalia



 (a) Name the class from which the animal with the structure above is found. (1 mk)

 …………………………………………………………………………………………………………………………………………………………………………………………………………………………

(b) State the functions of the parts labelled T and R (2 mks)

 T…………………………………………………………………………………………

 R………………………………………………………………………………………...

(c) Name the structure on the animal that protects S from mechanical injury. (1 mk)

 ……………………………………………………………………………………………………

(d) State the adaptations of the part labelled S (4 mks)

 ……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. (a) Define the term autotrophism (2 mks)

 ……………………………………………………………………………………………………………………………………………………………………………………………………………………

(b) Explain what happens during the light stage of photosynthesis (2 mks)

 ……………………………………………………………………………………………………………………………………………………………………………………………………………………

(c) Explain three adaptations of the mesophyte leaf to photosynthesis using the following heading

1. Palisade mesophyll layer (2 mks)

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1. Spongy mesophyll layer (2 mks)

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(d) State the role of Carbon (IV) oxide during photosynthesis (1 mk)

 …………………………………………………………………………………………………………………………………………………………………………………………………………………..

1. (a) Differentiate between the mode of fertilization in higher plants and in mammals (2 mks)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………

(b) Explain the role of the following hormones in the female menstrual cycle

* 1. Oestrogen (2 mks)

 ………………………………………………………………….………………………………………………………………………………………………………………………………………

* 1. Luteinizing hormone (2 mks)

…………………………………………………………………………………………………………………………………………………………………………………………………………

(c) Give two functions of the placenta during pregnancy (2 mks)

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1. (a) What is mutation (2 mks)

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(b) Explain why certain bacteria and other pathogens become resistant to drugs after some time (2 mks)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………

(c) Work out a cross between a Haemophiliac man married to a carrier woman for Haemophilia (3 mks)

 (d) State the phenotypic ratio of the children (1 mk)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………

SECTION B ***Answer question 6 (compulsory) and either question 7 or 8 in the spaces provided after question 8***

1. Two individuals X and Y drunk equal volumes of concentrated solution of glucose. The amount of glucose in their blood was determined at intervals. The results are shown in the table below.

|  |  |
| --- | --- |
| **Time** **(minutes)** | **Glucose level in blood****(mg/100cm3)** |
| 01530456090120150 | X | Y |
| 87112139116100959288 | 84123170188208202144123 |

(a) On the grid provided plot a graph of glucose level in blood against time on the same axes (7 mks)

(b) What was the connection of glucose in the blood of X and Y at the 25th minute (2 mks)

(c) Explain the causes in the level of glucose for the two individuals X and Y after 30 minutes (4 mks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………..

(d)Give your opinion on the Homeostatic condition of X and Y in respect to control of blood sugar level (2 mks)

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(e) (i) Name a hormone in the human body that regulates low blood sugar level (1 mk)

 ………………………………………………………………………………………………………………………………………………………………………………………………………………..….

 (ii) How does the hormone named in e (i) above act in the body (2 mks)

 ……………………………………………………………………………………………………………………………………………………………………………………………………………………

(f) (i) State the role of blood sugar in the human body (1 mk)

 …………………………………………………………………………………………………………

(ii) Name a disease ion the human body that results when the body is not able to control its sugar level (1 mk)

 ……………………………………………………………………………………..…………………

7. Describe the functions of the various parts of a mammalian skin. (20mks)

8. Discuss the various evidences which show that evolution has taken place. (20mks)

**JITEGEMEA HIGH SCHOOL**

**BIOLOGY PAPER TWO MARKING SCHEME. Form 4**

a) i. Phloem/phloem tissue: **1mk**

 ii. Sieve tubes have cross-walls called sieve plates that are perforated: to allow the flow of synthesized food material from one sieve tube to the next: **1mk**

Presence of cytoplasmic strandal/ protein strands that allow the streaming / flow of synthesized food material along them during translocation; **1mk**

Presence of companion cells next to the sieve tubes, which have numerous mitochondria to produce energy for translocation;  **1mk**

 b) In the soil water exists as a thin film in the soil particles /soil solution✓

 The concentration of the cell sap of the root hair is greater than that of the surrounding solution in the soil; ✓ 4mks total 8mks

The water molecules from the soil solution are drawn into the cell sap of the root hair cells: through the cell wall;✓ and semi-permeable cell membrane;✓ by osmosis; thus dilute the root hair cell sap causing it to become less concentrated than that of the adjacent cortex cell of the root;✓ water enter the cortex cell by osmosis; then pumped across the endodermis into the root xylem;✓

1. a) Pisces ; 1mk

b) T –gill rakers –– are used filtering food particles from the water before it flows over the gills; thus protect the gill filaments from mechanical damage /injury; 2mks

 c) Operculum; 1mk

d) Gill filament are numerous to provide large surface area for gaseous exchange; gill filaments have thin walls /one cell thick /epithelium wall to reduce the distance over which the gases diffuse; Gill filaments have moist surface/ covered by mucus to facilitate faster diffusion of respiratory gases; Gill filaments are highly vascularised / have dense network of blood capillaries to facilitate transport of respiratory gases to and from the gills. 4mks

 **Total 8mks**

1. a) Is a type of nutrition where organisms especially green plant6s and some bacteria manufacture their own food; from simple inorganic materials with the help of sunlight/chemical reactions; 2mks

 b) Light stage. Light trapped by chlorophyll pigments is used to split water      molecules chemically (in the granum) to produce hydrogen ions, and oxygen; some      of the light Energy is used to produce ATP molecules; 2mks

 c) i. Palisade mesophyll layer have cells with numerous chloroplasts; to provide      large surface for maximum photosynthesis; palisade mesophyll cells are numerous      to provide large surface are for photosynthesis; Any two 2mks

     Palisade mesophyll cells are found next to the upper epidermis; for maximum      absorption of sunlight for photosynthesis; any two

 ii. Spongy mesophyll layer has cells that have irregular shape and loosely packed        to provide large intercellular air spaces for free circulation of carbon (IV) oxide to        reach the photosynthesis cells; chloroplasts that provide a site for photosynthesis.

 Any one give 3 mks

 d) Carbon (IV) oxide reacts with hydrogen ions/ atoms in the presence of ATP/       energy to form simple sugars; 1mk total 8mks

1. a) Fertilization in higher plants –involves one male nucleus fusing with a functional; egg to form a zygote; while the other male nucleus fuses with the polar nuclei to form a triploid cell;

 In animals, fertilization involves the fusion of the male nucleus and female ovum    nucleus to form a zygote. 2mks

 b) i. Oestrogen

 Promotes / causes /initiate the healing /repair of the endometrium/ uterine’

 Stimulates the pituitary gland to secrete Luteinising hormone 2mks

 ii. Luteinising hormone (LH)

 –causes ovulation;

 –Stimulates the Graafian follicle remains to change into the corpus lutevis;

 –stimulates/causes corpus luteum to secrete progesterone any two 2mks

 –causes/stimulates the maturation of the Graafian follicle

 c) Provide site for exchange of nutrients and waste products between the material blood and the faetal blood system; secretes/ produces progesterone hormone; placenta attaches the foetus to the mothers’ uterus; mark the fist two.

 total marks 8mks

1. a) Mutation is a sudden / spontaneous change; in the genetic make up of an     organism; 2mks

b) Bacteria that survive the drug will undergo mutation; to produce bacteria which are resistance to the prevailing condition / drug; 2mks

c) Genotype Xhy x XHXh

rej= XH or XHXH

 Accept XHy n XH Xh

✓



3mks

✓

✓

 d) Phenotypic ratio: 1 male normal

 1 male haemophiliac

 1 female haemophiliac

 1 female carrier

 1male normal: 1male haemophiliac :1 female haemophiliac: 1 female carrier: 1mk

 Total marks =8mks

**SECTION B**

1. a) labeling axis = 2mks

 Scale mark =2/2=1 mk

 Plotting = 2mks

 Identification =2/2 = 1 mk

 Smooth curve= 2/2 = 1 mk

 Total = 7 mrks

 b) Concentration of glucose in blood of

 x at 25th minute = 130 + 0.5:

 y at 25th minute = 162 + 0.5: 2mks

 c) individual x, sugar level increase in the blood due to its absorption at the gut;✓         until 30 minutes;✓ after 30 minutes the level of sugar decreased in x as the liver         was converting excess to glucose by the help of insulin; to glycogen;✓

        Individual y the concentration of the sugar level does increase after 30 minutes          since the body has no mechanism of regulating it/ the body is not able to control          its body sugar. ✓ 4mks

 d) The individual x has the ability to homeostatically control the sugar level in               the blood; the individual y has no ability of controlling the sugar level               homoestaticaly; 2mks

 e) i. Glucagons; 1mk

 ii. the hormone ( is released by the pancreas when the sugar level is is below the  norm)l. Glucagon stimulate the liver cells to convert stored glycogen into                 glucose which is released into the blood; 2mks

 f) i. Blood sugar is used in the cells for respiration process to release/ produce             ATP/ energy for the cells; 1mk

 ii. Diabetes mellitus; 1mk

 Total marks 20mks

7**. Describe the function of the various parts of the mammalian skin.**

Epidermis which has three layers; which are:-

- Cornified layer that protects against dessication; and mechanical damages;

- Granular layer with living cells that give rise to cornified layer;

- Malphigian layer which actively divides to give rise to granular layer cells. Has melanin which screens against U.V light cells that produce melanin synthesis Vitamin D.

Has dermis layer which consists of many structures as follows:-

- Blood capillaries that supply food and oxygen; and remove excretory products;

- Arteries that vasolidate; and vasoconstrict; to regulate the temperatures.

- Has sweat glands that produce sweat which consists of water and salts; Sodium Chloride, urea and lactic acid’ acting as an excretory organ;

- Sweat produced evaporates to cool the body.

- Has hair follicles which have hair; which insulates against heat.

- Through heat regulation by lying and rising the hair, skin acts as a temperature regulator;

- It has nerve endings which are sensitive to various stimuli; the skin therefore acting as a sensory organ.

- Sebaceous glands which produce secretions containing oily substances are water repellant; antiseptic; and cracking of skin.

- Subcutaneous fat which insulates the body against heat loss.

8. **Palaentology/fossil records**;

- Fossils are past material remains of ancestral of organisms accidentally preserved in some naturally occurring materials e.g. sedimentary rocks. They provide a direct evidence of gradual change from one type of organism to another;

- Their age is determined by radioactive Carbon 14 dating; used to construct evolutionary history of development of a certain – organism; e.g. human skull, horse limbs e.t.c

- Comparative anatomy

Members of a phylum or group shows similarities in structures or organs performing similar functions; Homologous structure/divergent evolution; same embryonic origin but performing different functions; arose by divergent evolution e.g. pentadactyl limb of vertebrates.

- Analogous structure/convergent evolution; structures with different embryonic origins but evolved to perform similar functions due to exploitation of different ecological niches; They evoked by convergent evolution e.g. wings of birds and those of insects.

- Comparative embryology

 Study of embryos in their early stages of development e.g. those of vertebrates look similar; the more the similarity the more the evolutionary relationship.

- Cell biology;

 Structure and functioning of cells from almost all kinds of organisms are basically similar. All Eukaryotic cells contain same cell organelles; such as mitochondria lysosome; ER e.t.c. indicating a common ancestry.

- Geographically distribution;

 Initially there was one land – mass (pangae); split and parts drifted away forming the present continents; After the split members of some species occupying originally similar regions were isolated by barriers and evolved along their own line for instance illamas in S. America, Leopards and Cheetahs in Africa.

 (Max 21)