

BOKAKE

BIOLOGY PAPER 2

END OF TERM 2, 2024

MARKING SCHEME:

1. (a) Anaerobic respiration rej. Respiration alone. (1mk)
 - (b) (i) Glycolysis (1mk)
(ii) Cytoplasm (1mk)
 - (c) (i) Ethanol, Carbon (IV)oxide, energy
(ii) Lactic acid and energy (1mk)
 - (d) Pyruvic acid is further oxidized by oxygen in a series of enzymatic reactions into carbon(IV)oxide, water and energy. (1mk)
 - (e) Extra amount of oxygen required to get rid of the lactic acid that accumulate in the body tissues when the supply of oxygen is less than demand.
2. a) To investigate the effect of unilateral gravitation pull on the root and the shoot.
 - b) Seedling A – the shoot would curve and grow upwards; while the root would curve and grow downwards.
 - c) Seedling A – unilateral gravitation pull causes auxins to accumulate on the lower side of the growing region of the shoot and root; the high concentration of auxins on the lower side of the shoot stimulates more cell growth (cell elongation) on the lower side resulting in the the stem curivng upwards; The high concentration of auxins on the lower side of the root inhibits cell growth on the lower side while the upper side grows faster; This results in the root curving downwards;
Seedling B: gravitation pull has no unilateral effect on the shoot/root and therefore the distribution of auxins is not affected;
3. (a) Coccyx;
Caecum and appendix;
Nictating membrane; (Mark any one given)
- (b) - Fossil records
- Geographical distribution of organisms
- Comparative anatomy
- Comparative embryology
- Cell biology

(c) (i) They were easily camouflaged by the lichens on tree trunks hence not easily preyed on;

(1mk)

(ii) Selective predation (1mk)

(iii) Homologous structures are structures with same embryonic origin but have been modified to perform different functions; Analogous structures are structures with different embryonic origin but perform similar functions; (2mks)

4. (a) X - Carbon (iv) Oxide
Y - Oxygen

(b) – Broad and flat to absorb maximum light

- Have chloroplast with chlorophyll to trap light.
- Transparent cuticle to allow light to pass through. (3mks)

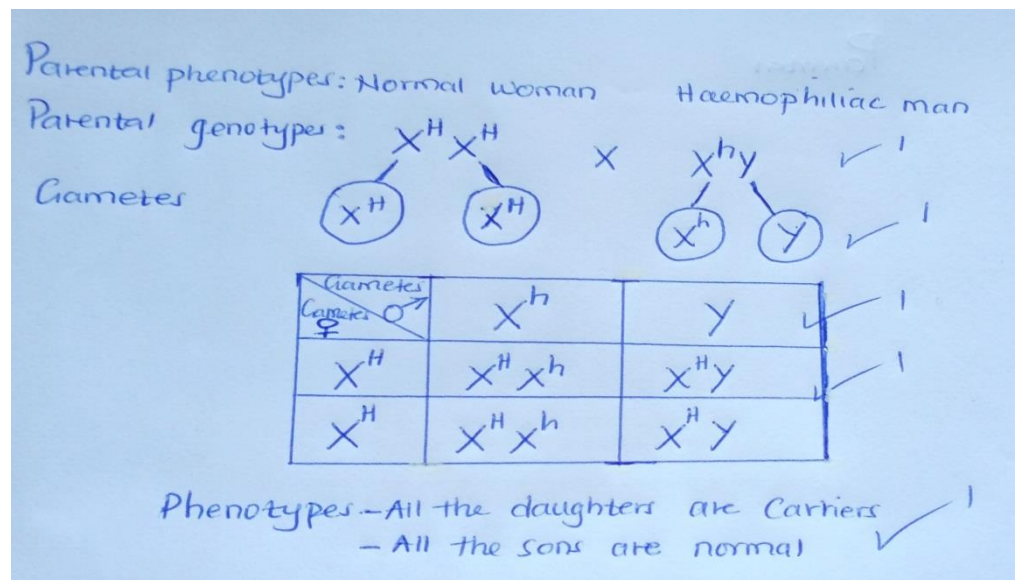
(c) Xylem – Transports water.

Phloem – sugars out of the leaf. (2mks)

(d) Starch is insoluble in water, hence osmotically inactive. This reduces effect on absorption of water by cells.

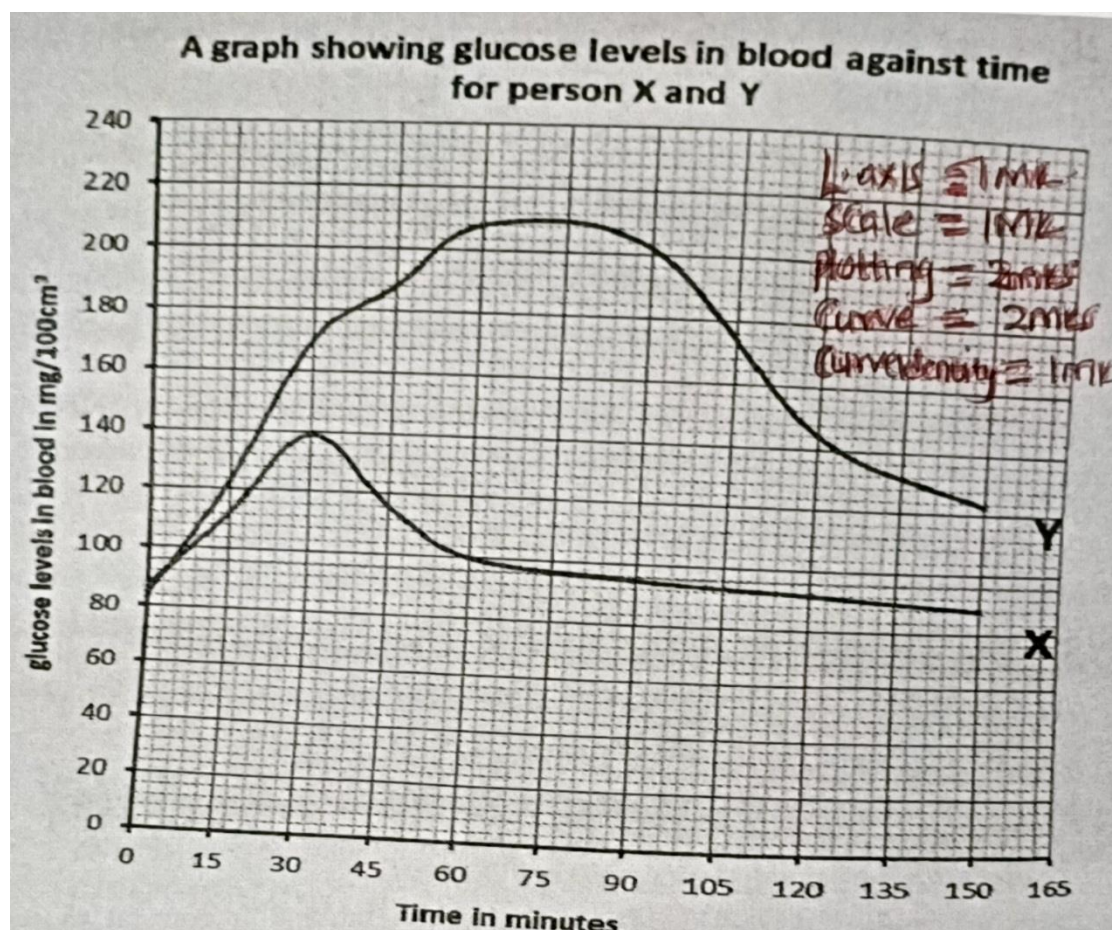
5. (a) These are genes located on the sex chromosomes and are transmitted together with those that determine sex. (1mk)

(b)



- (c) - Colour blindness
- Premature baldness
- Tufts of hair on pinna and nose. (2mks)

6. (a) (7mks)



(b) $X = 122 \pm 3$, $Y = 140 \pm 3$ (2mks)

(c) Person X is able to detect glucose when it rises above norm; hormone insulin is produced by pancreas. It stimulates liver cells to regulate glucose; while person Y is likely to be diabetic. (3mks)

(d) X- insulin released stimulates conversion of excess glucose into glycogen or fats for storage.

Y – Insulin not released, thus the decline is due to glucose being released in the urine.

(e) Adenosine triphosphate (ATP)

(f) Deaminated – where amino acids are broken down by removal of amino group resulting in formation of ammonia. Ammonia being toxic undergoes ornithine cycle where it combines with carbon (IV) oxide to form urea; urea is excreted by the kidneys and removed in urine; carboxyl group is oxidized as glucose or stored as glycogen.

7. (a) Describe how gaseous exchange takes place in terrestrial plant. (10mks)

- Gaseous exchange takes place in spongy mesophyll, and involves Carbon(IV)oxide (CO₂) and oxygen (O₂) gases. During the day CO₂ diffuses into air spaces of spongy mesophyll due to concentration gradient from the stomata then CO₂ diffuses into photosynthetic cells in solution form.
- In photosynthesis CO₂ is used while O₂ is produced. Some of the O₂ is used in respiration while the rest of O₂ diffuses out of the leaf through the stomata due to concentration gradient.
- At night, O₂ diffuse into air spaces of spongy mesophyll. Due to concentration gradient the oxygen dissolves into a film of moisture then diffuses into the cells in solution form and is used in respiration during which carbon(IV) oxide is produced. It then diffuses out of the leaf through the stomata due to the concentration/diffusion gradient. At night carbon (IV) oxide accumulates in the leaf since photosynthesis does not take place.
- Some gaseous exchange also takes place through the cuticle and epidermis of young leaves and stems. Also epidermis of roots carries out gaseous exchange with the air in the soil;
- Some plants have breathing roots called pneumatophores through which gaseous exchange occurs. In aquatic wood plant, these roots provide a large surface areas for gaseous exchange as they contain numerous lenticels.
- Gaseous exchange also occurs through lenticels mostly found in order stems. The cork cells of the lenticels are loosely packed to enable exchange of gaseous between atmosphere and the cork cells.

(b) Describe the mechanism of gaseous exchange in a mammal. (10mks)

Gaseous exchange occurs in two stages:

Breathing in or inhalation

External intercostal muscles contract while internal intercostal muscles contract. This causes lifting/raising the ribcage upwards and outwards. Muscles of diaphragm contract hence flattens, the volume of thoracic cavity increases and pressure decreases

than the atmospheric pressure. The higher air pressure in the atmosphere forces air into the lung and the lungs inflate.

Breathing out or exhalation

External intercostal muscles relax, while internal intercostal muscle contract. This causes the ribcage to move downwards and inwards. The muscles of the diaphragm relax and the diaphragm assumes a dome shape. This makes the volume of thoracic cavity to decrease while pressure increases than atmospheric pressure. Higher pressure in the thoracic cavity forces air out of the lungs and the lungs deflate.

8. Explain how abiotic factors affect plant. (20mks)

- **Wind:** In windy conditions the rate of transpiration increases. Wind disperses fruits/seeds and is an agent of pollination.
- **Temperature:** Changes in temperatures affects the rate of photosynthesis and other biochemical reactions/metabolic reactions/enzymatic reactions. Increase in temperature increases rate of transpiration. Low temperature inactivates enzymes hence lower rate of enzymes reactions. At optimum temperatures enzymes work best hence maximum enzyme activity.
- **Light:** Plants need light for photosynthesis. Some plants need light for flowering/Photoperiodism. Seeds like lettuce require light of certain wavelength for germination.
- **Humidity:** When humidity is low, the rate of transpiration increases;
- **pH:** Each plant requires a specific pH to grow to grow well (either acidic/alkalinity/neutral)
- **Salinity:** Plants with salt tolerant tissues grow in saline area, plants in estuaries are able to adjust to salt fluctuations;
- **Topography:** North facing slopes lands have more plants than South facing slopes. Plant on windward side have stunted/distorted growth;
- **Water:** Fewer plants are found in arid and semi-arid areas. Only plants with favorable adaptations can survive here. Water is needed for germination. It is a raw material for photosynthesis. It dissolves minerals salts and provides turgidity hence support in fruits, seeds, leaves and stems.
- **Atmospheric Pressure:** Variation in atmospheric pressure affects availability of CO₂ and O₂, which affects photosynthesis. At low atmospheric pressure there is increased rate of transpiration and affect amount of oxygen; for respiration.
- **Mineral salts/trace elements:**
 - Affects distribution of plants.
 - Plants thrive well where there are mineral salts in the soil. Plants living in the soils deficient in particular mineral element have special methods obtaining it; for example legumes obtain nitrogen by fixation or carnivorous. Insectivorous plant obtain Nitrogen from feeding on insects.

