KAPSABET HIGH SCHOOL

231/2

(*Kenya Certificate of Secondary Education*)

INTERNAL MOCK EXAM

BIOLOGY

Dec. 2020– 2 Hours

MARKING SCHEME

Instructions to candidates

a) *Write your Name, Index, Admission number and stream in the spaces provided above.*
b) *Sign and write the examination date on the spaces provided above.*
c) *This paper consists of two sections; A and B. Answer all the questions in section A in the spaces provided.*
d) *In section **B,** answer question **6 (compulsory)** and either question 7 or 8 in the spaces provided after question 8.*
e) *All workings must be clearly shown where necessary.*
f) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing.
g) Candidates must answer the questions in English.

231/2 - Paper 2 Marking Scheme

1 (a) Skin.
- Secretion of sebum which is antiseptic;
- Secretion of sweat which is antiseptic;
- Cornified layer is made of dead cells which prevents microbial entry;

(b) Respiratory surfaces
- Mucus on the lining of the trachea traps dust particles and microorganisms;
- Hairs in the nostrils traps dust particles and microorganisms;
- Sensory cells in the olfactory epithelium ensure only clean air is inhaled;
- Macrophage cells in the alveoli engulf and digest pathogens;

(c) – Hydrochloric acid in the stomach kills any microorganisms swallowed with food;
- Parts of the alimentary canal like the stomach have goblet cells that secrete a mucoid lining;

2 (a) Basement membrane is the filter; most proteins are too big to pass through so through the tiny pores in the glomerular capillaries;
- Glucose being a smaller molecule all passes through the membrane; but all the glucose is reabsorbed by active transport back into the bloodstream;

(b) A**ny three from**
- Sodium ions is a similar proportion in both the filtrate and the plasma because all the Na^+ in the plasma is filtered off.
- Sodium ions concentration at the end of proximal convoluted tubule is same to that in plasma and filtrate in Bowman's capsule because sodium ions and water are reabsorbed in proportional amounts through the proximal tubule.
- Sodium ions concentration at bottom of loop of henle is very high because sodium ions are concentrated by the bottom of the loop of henle to provide an osmotic gradient through the medulla that ensures reabsorption of water by osmosis from the glomerular filtrate back to the body cells;
- Concentration in the distal convoluted tubule and collecting duct decreases // is low because in the distal tubule and collecting tubule the sodium content of the plasma is adjusted (actively absorbed) (under hormonal control;

(c) Absorption of water in the proximal tubule increases the urea concentration (fivefold/by 500%); later reabsorption of water further increases the urea concentration/ some urea is absorbed into the nephron;

(d) Any one from:
- Only some of the fluid (about 20%) leaves the plasma thus reducing the volume and therefore the pressure is Bowman's capsule is lower
- Friction with the walls reduces the flow/hydrostatic pressure is reduced (as fluid moves through the nephron)
- Flow rate falls as water is removed by osmosis;

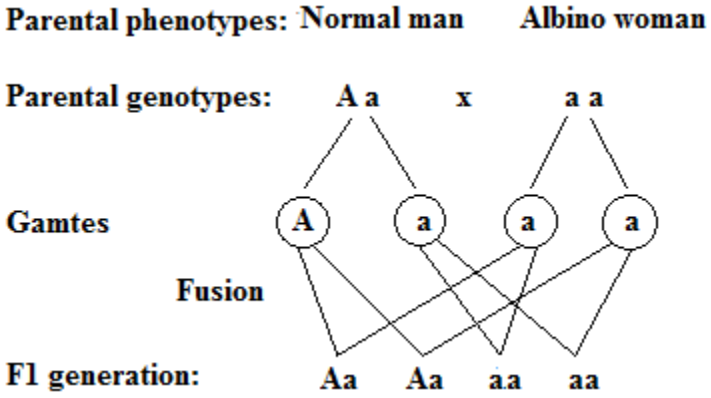
(e) - Low temperatures reduce the rate of respiration/metabolic rate / reduces production of ATP and this causes a reduction in the rate of active transport/operation of carrier proteins
- Rate of reabsorption is not quick enough for glucose to be fully removed from the filtrate;

3 (a) Humans – discontinuous;
Cattle – discontinuous;

(b) (i) Aa;

(ii) Yes, the probability of having an albino at each birth is 25% / ¼ / 0.25;

(iii) Crossing



4 (a) That the rate of transpiration is equal to the rate of water uptake (actually measured using the apparatus);

(b) (i) To prevent air collecting in the xylem vessels/air locks preventing water uptake;

(ii) The open end of the capillary tube is exposed to the air which is drawn up as the shoot takes up water;

(iii) To enable the air bubble to be moved back to the origin;

(iv) To allow the rate of transpiration to acclimatise to the surrounding conditions;

(c) (i) Any three from
- Transpiration is reduced when the plant is covered with a (clear) plastic bag since the air becomes more humid; and there are no air currents; humid air reduces the diffusion gradient of moisture out of the plant / no air movement allows diffusion shells to build up
- Transpiration is further reduced when the plant is covered with a black plastic bag since the stomata close in the dark; thus the main route of water loss from the leaf is closed/only cuticular transpiration occurs;

(ii) $90 \times 0.8 = 72\ mm^3$;
$72 \div 10 = 7.2\ mm^3\ min^{-1}$;

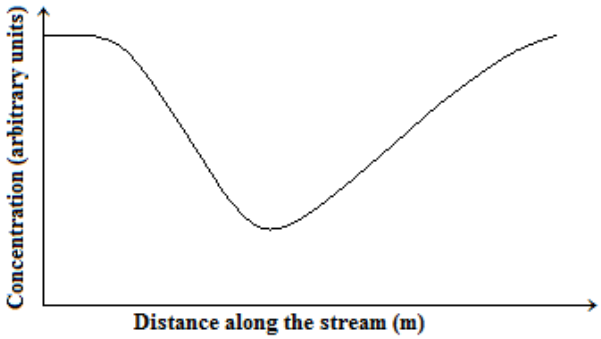
(d) Different shoots may be different sized/differ in the number of leaves/ differ in the size of leaves/other appropriate response;

5 (a) (i) – Are overlapping; with free ends facing backwards; to reduce resistance during swimming in water; and prevent water from coming into contact with the skin;

(ii) Contractile; to contact and relax; to allow for forward propulsion;

(b) – Have ligaments which are inelastic to hold adjacent bones at a joint;
- Have articular cartilage which is hard yet soft; to absorb shock between adjacent bones;
- Have synovial membrane which is secretory; to secrete synovial fluid; which lubricates the joint; and absorbs shock at the joint;
- Have joint capsule, a casing that holds the joint together;

6 (a) Graph:
Expected trend



Marking:
Scale = 1mark
Labeling = 2 marks
Plotting = 2 marks
Curve = 2 marks)

(b) (i) 50m ± 2;
Reject without units

(ii) 1.8 ± 0.1units
Reject without units

(c) (i) Sharp decline in oxygen concentration; slurry leakage at 20m released raw sewage into the river; the slurry / raw sewage contained organic matter and microorganisms; the microbes like bacteria and protozoa broke down the organic matter utilizing dissolved oxygen in the water for respiration;
Owtte

(ii) Gradual rise in amount of dissolved oxygen until the original concentration before slurry leakage; amount of organic matter in the river decreases distance downstream; less oxygen is used in aerobic respiration; slurry breakdown releases more minerals ions like nitrates, phosphates etc in water; which lead to increased growth of water plants; the water plants carry out photosynthesis releasing oxygen in water;
Owtte

(d) - Run-off fertilizers increases the amount of mineral ions in water; leading to excessive of growth of water plants and algae //algal blooms; hence eutrophication (explanation of eutrophication);
- Run –off fertilizers may alter pH of the water hence negatively affecting organisms in the water;

7 (a) - They have small anthers, which are firmly attached to the filament; to resists breakage when insects make contact;
- They have large, heavy, and rough pollen grains; to stick onto the body of the insects.
- They have stigmas, which are small, sticky and occur inside the flower; so that pollen on insects' bodies easily stick onto them;
Note: essential parts = parts used in reproduction

(b) - Once the pollen grains land on the stigma, the stigma produces a sticky chemical substance; that provides a suitable medium for generation of the pollen tube from the pollen grains;
- As the pollen tube grows down the style; it receives nutrients from the surrounding style tissues;
- The tube nucleus takes its position just behind the tip of the pollen tube;
- The generative nucleus divides mitotically; to form two male nuclei;
- The pollen tube enters the ovule through the micropyle; and bursts open creating a clear way for the passage of the two male / generative nuclei;
- Once the pollen tube bursts, the pollen tube nucleus degenerate;
- One of the male (generative) nuclei fuses with the polar nuclei; to form a triploid primary endosperm nucleus;
- The second male (generative) nucleus fuses with the egg cell nucleus; to form a diploid zygote;

8 (a) **Describe how the mammalian eye is adapted for accommodation.**
- The iris; is opaque and contracticle; to control light intensity/ amount of light entering the eye (by controlling the size of the pupil);
- Ciliary body; contains ciliary muscles; which are contracticle; for controlling the curvature and hence focal length of the lens.
- Suspensory ligaments; are fibrous; to hold the lens in position.
- Have a transparent; biconvex lens; to allow light to go through; to refract the light; and to focus the light.
- External eye muscles; is contractile; to move the eyeball (within the socket).

(b) - When sound waves are trapped by the pinna, they are directed inwards into the auditory canal and then to the ear drum.
- Wax in the auditory canal trap dust particles and microorganisms in air.
- The sound waves cause the eardrum to vibrate with the same intensity as the sound waves; thereby converting the sound waves to vibrations.
- The vibrating eardrum causes the ear oscicles (malleus, incus, and stapes) to vibrate inturn.
- The oscicles amplify and transmits the vibrations to the oval window (fenestra ovalis).
- The vibrations of the oval window are transmitted to the fluid (perilymph) in the cochlea i.e. within the vestibular canal of cochlea.
- The perilymph transmits vibrations into the endolymph;
- Displacement / movement of the endolymph causes the movement of the sensory hair cells within the organ of corti;
- This movement of the hair generates impulses in the sensory hair cells.
- The impulses are transmitted into the brain (cerebrum) via the auditory nerve.
- The brain then translates the impulses to perception of sound.