

KANDARA SUB-COUNTY FORM 3 JOINT EVALUATION

Kenya Certificate of Secondary Education

BIOLOGY

Paper - 231/2

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Marking Scheme

1.a)i) Capillaries;

ii) Site of exchange of materials between the blood and the cells;

iii) Numerous for efficient transport;

- Have a thin lining /epithelium for easy diffusion;
- They are narrow to create pressure for ultrafiltration;

b) Pulmonary arterioles Pulmonary venules.

- Low oxygen concentration
- High carbon (IV) oxide concentration.
- High oxygen concentration
- Low carbon (IV) oxide concentration;

c) Have valves to prevent back flow of blood;

- Have a wide lumen to reduce resistance to blood flow.
- Passes through skeletal muscles which push the blood forward;

2. i) Osmosis;

ii) The feel is impervious; hence cannot allow water to pass through;

iii) The sugar solution level rises /water level in the trough falls; water moves from the trough through the semi permeable cell membrane of the pawpaw by osmosis; to the sugar solution; causing it to rise.

iv) No change / no observation change; boiling destroy / alters / changes the cell membrane structure hence the water cannot pass through / osmosis cannot take place;

3.a)i) Herbivorous Rej: Herbivore acc.
Herbivory.

Structural

ii) Tooth J is narrow / sharp / chisel like while tooth L is broad / ridged . Acc. J has one root while L has 2/3/4 roots.

Functional

Tooth J is used for biting / cutting while L is used for grinding.

ii) Diastema

b) Broad flat lamina to give a large surface area for absorption of carbon (IV) oxide and sunlight.

- It is thin to reduce the distance through which gases travel.
- Has a transparent cuticles to allow light to reach photosynthetic cells.
- Has palisade cells on the upper side for efficient absorption of light energy.
- Has large number of chloroplasts to trap/ absorb light energy.
- Extensive network of veins for effective transportation of water and minerals salts and synthesised food.
- Has air spaces in the spongy mesophyll for faster movement of gases.

4.a) It is thin to reduce distance of diffusing gases moist to dissolve gases.

- Presence of dense capillaries to transport the gases.
- Numerous to increase the surface area.
- Well ventilated to maximize the amount of air getting to these surface.

ii) Adult frog - skin / mouth / lungs
Whale - lungs / alveoli.

- b) A - spiracle
Y - Tracheole.

- ii) Allows air in and out of the tracheal system;
iii) To offer support / prevent collapsing of the trachea.

5. a)

	Kingdom	Reason
X	Protoctista	Has a definite nucleus; has cell membrane only enclosing the cytoplasm; has membrane bound organelles
Y	Monera	Has no nucleus / DNA is suspended in cytoplasm. Has both cell membrane and cell wall.

b)

Kingdom	Structure	Reason
J	Capsule	for protection / produces toxins
K	Flagellum	for locomotion

6. a) Phytoplankton.

b) Hawk

c) i) Phytoplankton → snail → hawk

ii) Phytoplankton → zooplanktons → frogs → water snakes → hawks;

Phytoplankton → insects → small fish → water snakes → hawks;

d) The number / population of water snakes would decrease due to shortage of food;

- Number of zooplanktons increases due to decrease in predators;

e) Decrease in light intensity / poor light penetration; decreases the rate of photosynthesis; (hence decrease in productivity)

6. Graph: Dry weights against time

- b) 38.5 ± 0.5
accept a range of 0.5 above and below the given value
- c) i) Hydrolysis of starch into simple sugars; which are translocated to embryo; and oxidised in respiration to release energy (for germination); heat and gaseous products;
- ii) New materials are synthesized (from proteins); bringing about growth of embryo;
- iii) The rate of respiration is faster than that of synthesis of materials for growth;
- iv) First foliage leaves were formed; that carried out photosynthesis leading to growth;
- d) j)- Presence of germination inhibitors (abscisic acid);
- Embryo not fully developed (immaturity of the embryo):
 - Absence or inactivity of germination hormones or enzymes (accept gibberellins, cytokinins);
 - Impermeable testa (seed coat):
- ii)- Unsuitable temperatures (unfavourable temperatures);
- Absence of light;
 - Lack of or absence of water (moisture):
 - Lack of oxygen;
- e)- Dense cytoplasm;
- Thin cell wall;
 - Absence of vacuoles (cell sap);

7.a) Describe how structural factors decrease the rate of transpiration in terrestrial plants.

Plants in arid and semi arid / desert habitats have leaves covered with thick / waxy cuticles that are water proof / impermeable to water; allowing for reduced rate of transpiration; sunken stomata; in some desert/ semi arid areas plants have water vapour accumulating in the pits is not carried away by wind; most plants have few or no stomata on the upper surface of the leaf / more stomata on the lower surface sheltered by from direct sunlight; the fewer the stomata the less the

water loss from the plant. Some plant have small stomata / small stomata size; thus reducing transpiration rate plants with small needle like / spine; expose less surface area hence reduce the rate of transpiration leaves with shiny surface; reflect light resulting in reduced leaf temperature thus reducing the rate of transpiration, some plants have leaves covered with hairy / scales; which trap a layer of moisture; (on the leaf surface) reducing the rate of transpiration. Plants growing in wet habitats / mesophytes have a thin layer of cuticle which allow high rate of transpiration broad leaves; expose a large surface area; many stomata on both sides of the leaves; have a large stomata.

7.b) Describe how the various structure of human female reproductive system are adapted to their function.

Ovaries

- have several graafian follicles that develop and burst open to release / produce mature ova.
- Secrete sex hormones (oestrogen) which initiate / control development of secondary sexual characteristics
- Produce hormones oestrogen and progesterone which prepare the uterus for implantation and subsequent nourishment of the embryo.

Oviduct (fallopian tube)

- are thin narrow and tubular to increase flowing speed of semen contain sperms.
- are funnel shaped on the end next to ovary which enables them to receive the ovum.
- their lining contains cilia which propel the ovum towards the uterus.
- has peristaltic muscles that enable movement of zygote / ovum to the uterus for implantation.
- is fairly long to increase surface area for fertilization.

Uterus

- Is muscular for protection of developing embryo.
- has elastic wall that allows growth and development of foetus / embryo.
- has a highly vascularised endometrium that

provides nutrients/ gaseous exchange to developing embryo.

Cervix

- has valves that close the lower end of the uterus to ensure continued pregnancy during gestation period.
- is capable of dilating.
- has narrow entrance / neck-like entrance to uterus that enables quick swimming of sperms to uterus.
- has suction mechanism that draws up / pulls sperms into uterus.
- has a 'W' shape that fits well with the glands of the penis to ensure sperms are deposited at the right point.

Vagina

- is elastic and muscular to enable good accommodation or penetration of the penis thus proper deposition of sperms and for easy parturition.
- allow menstrual flow.
- has sensitive labial walls which secrete / produce lubricating substances that ensure / enable /facilitate good condition.
- Capable of considerable enlargement, due to elastic muscles, to accommodate baby during parturition.

Clitoris

- Has sensitive cells for orgasm

8.a) Describe how excretion takes place in mammalian kidneys.

Blood reaches the kidney from the renal/ renal artery enters the kidney; then branches into capillaries /glomeruli / in the Bowman's capsule, blood vessels leaving the capsule/ efferent are those entering it/ afferent causing high pressure to develop in the glomeruli. This forces the plasma / causes ultra filtration into the capsule. The filtrate contains waste products (acc. one example) The filtrate moves in to the proximal / first convoluted tubule; where selective reabsorption of glucose amino acids, some water and vitamins take through the loop of Henle; excretory products / urea, excess water and salts. ac, one example) pass into the distal tubule, where the remaining useful substance (acc. one example e.g. salt and water) are

reabsorbed; the filtrate passes into the collecting tubule; where more reabsorption of water takes place; Excess water, urea and salts (all three must appear) / Urine are removed through the ureter.

b) Explain how abiotic factors affect living organisms.

Wind.

- this influences rate of water evaporation from organisms.
- therefore it affects distribution of organisms e.g. wind increases rate of transpiration and evaporation of water from the soil.
- wind is an agent of soil erosion, may break and uproot trees.
- May aid in the formation of sand dunes which can form habits for some desert plants.
- Wind disperses fruits, seeds, spores.
- Wind forms waves in lakes and oceans which enhances aeration of water which replenishes oxygen concentration necessary for life.
- Wind is an agent of pollination.

Temperature.

- Influences rate of enzyme action in photosynthesis and other metabolic reactions in plants and animals.
- Organisms function within a narrow range of temperature.
- it affects distribution of organism.
- changes in temperature affect rate of photosynthesis and biochemical reactions e.g. metabolism and enzyme reaction.
- temperature increases rate of transpiration.

Light.

- needed by green plants and photosynthetic bacteria which are primary producers.
- animals depend on plants directly or indirectly of food.
- main source of light is the sun.
- light is necessary for synthesis of vitamin D in certain animals.
- some plants need light for flowering.
- seeds like lettuce need light for germination.

Humidity

- amount of water vapour held by the air.
- affects the rate at which water is lost from organisms body by evaporation and stomatal transpiration.
- When humidity is low the rate of transpiration increases.
- humidity influences distribution of organisms.

pH.

- each plant requires a specific pH in which to grow (acidic, natural or alkaline)
- pH affects enzyme reaction in metabolism.

salinity.

- Some ions are needed for plants and animal nutrition.
- Osmoregulation in plants and animals is affected by salinity.

Topography

- altitude affects light, atmospheric pressure and light.
- slope influences surface runoff, wind erosion etc.
- mountains affect distribution of organisms which differs in leeward side and windward side.
- mountains affect distribution of organisms which differ on lowlands and on highlands.
- mountains also form physical barriers to migration of organism and may cause isolation of species.
- Background may offer camouflage to some organisms hence protection from enemies.

Rainfall (water) of precipitation.

- amount of distribution of rainfall affect vegetation type.
- This consequently affects distribution of animals e.g. polar region water frozen hence only well adapted organisms survive.
- fewer organisms found in deserts where rainfall is less.
- Water is required for seed germination, raw material for photosynthesis, solvent for mineral salts. Provides turgidity of plant support, medium for transport, disperses fruits seeds and spores.

Pressure.

- The weight atmosphere exerts upon the earth. varies with altitude 9th higher the altitude the less the pressure.
- this variation implies change in density which directly means less oxygen for respiration and less carbon (IV) oxide for photosynthesis and this affects distribution of organisms .

Minerals salts (trace elements)

- these affect destruction of plants in the soil.
- plants thrive best where elements are available.
- plants living in soil deficient in a particular elements must have special methods of obtaining it.
- the harbour nitrogen fixing bacteria and others have carnivorous habit.
- plant distribution influences animal distribution.