WAKISSHA JOINT MOCK EXAMINATIONS
MARKING GUIDE
Uganda Advanced Certificate of Education
BIOLOGY P530/2
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QUESTION 1

(a)	Increase in time of the day from 12.00 to 0.00 hours leads to decrease in The rate of water uptake; to a maximum at 0.00hours because of decrease in light intensity; thus an increase in humidity and a decrease in temperature; reducing transpiration rate; to a minimum at 0.00 which causes reduced transpiration pull; also decrease in temperature; Increase in time of the day from 0.00 to 12.00 hours leads to increase in water uptake; to a peak at 12.00hours; due to increase in light intensity causing opening of many stomata; increasing transpiration rate, which increases transpiration pull to a maximum at 12.00hours. Also temperature increases; increasing kinetic energy of water molecules; reducing shell of water vapour / humidity around leaf surface;	max 12
(b)	Rate of water uptake is generally higher in group A than group B: because of no synthesis of wax in group A leaves, as enzyme is absent; resulting into absence of waxy cuticle left becomes more permeable to water ; allowing excess transpiration, causing large transpiration pull; While in Group B, no mutation there is synthesis of wax as enzyme is present, wax make left cuticle to impermeable to water less transpiration consequently less uptake of water.	Max 07
(c)	**Differences** Sucrose content in leaves / Sucrose content in stem phloem Higher at all time of the day / Lower at all times of the day Attains a higher maximum/peak / Attains lower maximum/peak Increases rapidly between 06.00 hours to 13 hours / Increase gradually between o6.00 hou to 13.hours Attains a maximum earlier / Attains a maximum later **Similarities** - Both sucrose content of leaves and stem phloem; - decrease between 0.00 to 06.00 hours - Attain a minimum between 0 hrs and at 6hrs; - Increase between 06.00 hours to 13.00 hours - Decrease after attaining a peak/maximum; - Attain peaks / maximum	Max 09
(d) (i)	As sucrose content of leaves increase sucrose content of stem phloem also increase; because increase in high intensity causes more sucrose synthesis in leaves; which increase concentration of sucrose in leaves phloem causing much osmotic uptake of water from neighbouring xylem; which increases pressure in leaf phloem; increasing mass flow of sucrose into stem phloem; As sucrose content of leaves reduce sucrose content of stem phloem also reduce; due to reduced light intensity causing less synthesis of sucrose in leaves; reducing concentration of sucrose in leaves phloem; reduced osmotic uptake of water from neighboring xylem vessels; reduced pressure in leaf phloem; reducing sucrose mass flow to the stem phloem;	Max 12

	Leaf sucrose concentration is higher than in stem because in leaves there synthesis of sucrose while in stem no synthesis but only transportation.	
(ii)	Sucrose content of the stem would reduce; because loading of sucrose in leave phloem is an active process which requires energy, and is inhibited with respiratory poison which inhibits energy production from respiration thus no loading and synthesis of sucrose in stems and leaves respectively.	~~Max 04~~ 04
(iii)	- Uptake of water; which is a raw material for photosynthesis/reactant in hydrolysis reactions / medium of transportation etc; - Uptake of mineral salts that are essential in synthesis of many biological molecules / are activators; - Distribution of food to growing regions parts;	~~Max 03~~ 02
(e)	Plants species can occupy avoider range of habitants as it has thicker waxy cuticle; to reduce water loss, while plant in group A have a narrow range of habitat restricted to only aquatic environments.	~~Max 03~~ ~~03~~ 03
2.(a)	Functions of lipids. - Adipose tissue - insulation and protection - production of energy on respiration - Phosphplipid – maintaince of cell membrane integrity - glycolipids – cell recognition - glycolipids - membrane transport - Lipoproteins – transportation of substance eg cholesterol. - subcutaneous of adipose fat – storage of vitamins A,D,E,K - Synthesis of hormones e.g steroids - Synthesis of molecules like protein or carbohydrates, wax - waxes ~~and chitin~~ are ~~waxy~~ proof	Any 12 @ 1 mark
(b) (i)	Branching of carbohydrates chain increase number of free ends to which other molecules can bind and break down / digest the carbohydrate simultaneously for faster release of energy. - It enables loose packing of molecules ensuring buoyancy/being light - Increases surface area over which metabolic reactions can take place.	Any 4
(ii)	Why organisms store lipids rather than carbohydrates - Lipids are lighter - Release more energy - Are inert - Have no osmotic potential / pressure - ~~Are water proof~~	Any 4 @ 1 mark
3. (a)	**Amoeba** It is fresh water organism so does not experience increased osmolarity/ potential, It experiences increased water inflow into its body so there is decreased osmotic potential, to counteract this a contractile vacuole is formed, the excess water taken in collects in the contractile vacuole, the inner membrane of the contractile vacuole is impermeable to the outflow of water by osmosis back into the cytoplasm . On reaching the cell membrane the vacuole fuses with it, contracts and releases its contents by exocytosis.	@ ½ mark 6 marks 06 max

	Humans: Controlled by ADH/ vasopressin hormone, increased osmolarity / solute/salt concs / decrease in potential of blood is due to lower water concentration; hypothalamus detects changes and release ADH which cause selective reabsorption of water from glomerular filtrate by making kidney distal tubules and collecting ducts permeable to water thus reduces volume of urine and frequency urination. ADH also stimulates thirst center causing thirst leading to drinking lots of water Decreased osmotic potential results from high water concentration of blood, little or no secretion of ADH causes the distal convoluted tubules and collecting duct to become impermeable to water little or no water reabsorption from glomerular filtrate take place causing frequent passage of dilute urine ~~frequently~~	@ ½ marks 10 marks
(b)	**Endothermy** - Allows organisms to thrive in a wide range of envt's. - Higher metabolic rates yields more energy for quick response. - Allows maintaince of constant body temperature. - Allows organisms to be active throughout the 24 hour period.	4 marks
4. (a)	**Similarities** - Both involve gamete fusion. - Both involve gamete formation by meiosis. - Both involve usually two parents. / Both involve two parents - In both gametes are haploid - Both require transfer of male gametes - In both fertilization occurs in female reproductive organ; - Both result into high parental care; - In both male gametes is smaller in size than female gamete; - Both result into formation of diploid zygote; **Differences**	07 Max

Sexual reproduction in plants	Sexual reproduction in mammals.
Male gamete is non-motile	Male gamete is motile
Male gamete transferred to female organ by insects, wind;	Male gamete introduced into female through intermittent organ;
Double fertilization occurs	Double fertilization does not occur / only one pair of gametes fuse usually;
Product of fertilization is diploid cell and triploid cell	End product of fertilization is diploid cell only / NO Mutation occurs.
~~Fertilization occurs in female flower~~	~~Fertilization occurs in oviduct~~
Gamete formation is not hormone controlled	Gamete formation is hormone controlled
Self-fertilization is common;	Self-fertilization is rare
Involves no courtship	Preceded by courtship
~~Pollen tube formation occurs~~	~~No pollen tube formation~~
No locomotion in ~~such~~ for mates	Usually locomotion in ~~such~~ for mates

~~Max 11~~ at least 04 for each part

(b)	Reproduction of water dependant gametophyte generation and complete dominance of sporophyte generation which is resistant to desiccation;	~~Max 09~~

	and protects gametophyte, protection of male nucleus / gamete inside pollen grains; with hard impermeable outer covering; that prevents water loss; Fertilization occurs inside ovule; or flower protecting gametes from direct exposure to sunlight; and protecting delicate zygote; Male nucleus is carried to female nucleus by pollen tube; which is negatively aerotropic; hence grows downwards into ovule / away from air; preventing exposure of male nucleus to heat. Reduced dependence on water for gamete transfer; as gametes are transferred by wind and insects; and require little moisture to germinate into pollen tube; – Seeds undergo dormancy process – Hard seed coat to prevents water loss	08max
(c)	The counter current exchange system maintains a ~~stiff~~ steep/high concentration gradient which ensures maximum exchange of materials between both maternal and ~~petal~~ fetal blood. Maternal and fetal blood capillaries are in close proximity to each other to reduce the diffusion distance, but also the fluids flowing in both of them flow in flow different directions which ensures complete exchange of materials as the concentration gradient is ~~stiffly~~ steeply maintained.	@ 1 mark Max 5 marks
5. (a) Any 3 correct examples	Displacement activity is an irrelevant or ~~outing~~ of context behavioural response an animal emits when in state of stress it occurs when motivation is high with ~~too~~ two conflicting "releasers" presenting themselves / to release Frustration / anxiety released It serves a purpose of preventing/ diminishing open conflict eg birds fighting may suddenly preen themselves or peck the ground. Human beings when in stressful situations may smoke; stroke forehead scratch ears or eyes walk up and down or clean the house etc. In stickle bucks which are in dispute, may adopt a vertical position with the head pointing downwards and start digging sand. Females when approached by males may blush, straighten hair, clothes lick their lips or scratch ears etc	Explanation 3 marks 3 examples @ 1 mark = 3 marks
(b) (i)	**Territoriality** – ~~Protection of mating individual~~ - ensures mating / Increases chances of Mating - ensures space and resources available - guarantees optimum utilization of habitant – Reduction in aggression - means of regulating population size – Limits mating to fit individuals only - means of communication in organisms ie social hierarchy - defence and protection of organisms – Minimizes Spread of diseases - guarantees sharing of resources amongst population	Any 7 @ 1 mark
(ii)	**Courtship** – Protection of mating individuals Courting - tightening of social bond between counting individuals - synchronize mating and fertilization – Stimulates organisms into sexual activity. - successful mates pass as their genes to next generation - filters out unfavourable genes out of the population (natural selection) – Ensures Parental Care - Synchronizes gonad dev't such that gametes mature at the same time. - diminishes aggression / conflict between males and gametes e.g in spiders. – Ensures that mating occurs in sexually mature organisms. - removes possibility of inbreeding	Any 7 @ 1 mark

Reduces other – Avoidance of body contact, escape behaviour.

6. (a)	Use of broad spectrum pesticide may lead to pest resurgence; where the number of pests after treatment increases to more than before the treatment; This is because the pesticide not only kills the pest, but also the predators of the pest; so that any few surviving pests multiply rapidly; as their population is not checked; As the pesticide is persistant, it remains in the environment for long periods; and in the bodies of organisms; where it is metabolized into more toxic forms; and accumulate to more toxic concentrations in predators / organisms at higher trophic levels; causing birds to lay thin shelled eggs that easily break; reduces disease resistance; increases productivity at low trophic levels; by reducing productivity at high trophic levels; etc Cause pest resistance; where certain pests develop mechanisms to break down/resist pesticide; making pesticide ineffective;	Max 10 marks
(b)	Application of nitrate / phosphate fertilizers; in farms near water bodies results into washing of fertilizers into lakes by flowing water; causing eutrophication; Rapid growth of algae/ aquatic plants; which increases competition; many die and are decomposed as number of consumers takes long to increase; rapid decomposition rapidly uses up oxygen; in water increasing biochemical oxygen demand; decrease in dissolved oxygen below those necessary for survival and growth of aerobes; causes death of aerobes such as fish; decomposition of dead fish aerobes further increases the oxygen demand; species diversity decreases; oxygen depletion may favor growth of anaerobic organisms; Also turbidity of water may be increased; reducing light penetrations; for submerged aquatic phototrophs; reducing photosynthesis; that further reduces oxygen production / dissolution;	Max 10 marks

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