2019 UACE P530/1 BIOLOGY MARKING GUIDE

Section A

1. D	**6.** free	**11.** C	**16.** A	**21.** A	**26.** D	**31.** C	**36.** D
2. A	**7.** C	**12.** D	**17.** C	**22.** C	**27.** B	**32.** C	**37.** D
3. free	**8.** A	**13.** A	**18.** D	**23.** B	**28.** A	**33.** A	**38.** B
4. D	**9.** C	**14.** D	**19.** B	**24.** D	**29.** C	**34.** A	**39.** D
5. D	**10.** B	**15.** B	**20.** C	**25.** A	**30.** B	**35.** B	**40.** C

Section B

41. a) This is a factor which is nearest to its minimum value in a chemical process that is affected by more than one factor.

b) When light and temperature are optimum, and carbon dioxide concentration is low, the rate of photosynthesis can't increase further.

c)

Light dependent	Light independent
Occurs in thylakoids	Occurs in stroma
Requires light	Does not require light
Forms ATP	Uses up ATP
Reduces NADP	Oxidizes NADP
Raw materials are water, NADP+ and ADP + Pi	Raw materials are carbon dioxide, ATP, NADPH
Oxygen is given off	No oxygen is given off
Products are ATP and NADPH	Products are sugars and oxidized NADP

42. a) i) Increasing gene flow reduces recessive alleles or disadvantageous alleles in the population as it introduces new alleles that reduces the selection pressure for the heterozygote advantage. - *(The disadvantageous allele is diluted). (E.g. sickle cell in America, as blacks married the whites, the allele was diluted).*

ii) In isolated populations mutations and natural selection occur differently causing them to develop into distinct species.

b) Sickle cell trait is caused by an allele in a heterozygous state. Malaria acts as a selection pressure for the heterozygote promoting their existence in a population with high malaria incidence.

43. a)

- Allows nerve impulses to move in one direction.
- Amplifies strength of nerve impulses
- Produces a coordinated response by integrating stimuli from different sources.
- Allows weak stimuli to be filtered out before reaching the brain.
- Prevents damage to the effector through adaptation/fatigue.
- Allows weak stimuli to cause a response through facilitation.
- Allows control of different neurotransmitters in the brain thereby controlling behavior
- Promotes transmission of impulses between two or more nerves.

b) i) Cholinesterase hydrolyses acetyl choline into choline and acetyl. This prevents continuous firing of impulses/action potentials and allows resynthesis of acetyl choline.

ii) Impermeability of the membrane prevents entry of sodium ions which would cause depolarization.

44. **a)** complex to simple molecules is ***X*** , and simple to complex molecules is ***Y***

b) ***A***- Respiration ***B***- ATP ***C***- Photosynthesis

c)

- To supply energy for synthesis of materials/cell division/transport/ and other activities in the cell.
- To provide a phosphate group during phosphorylation.
- Temporary store of energy.

d)

Oxidative phosphorylation	Photophosphorylation
Energy for the reaction is from oxidation of organic compounds.	Energy for the reaction is from sunlight.
1st electron donor is hydrogen.	1st electron donor is water.
Products are ATP and water	Products are ATP, NADPH and oxygen.
Last electron acceptor is oxygen	Last electron acceptor is NADP.
Occurs in the mitochondria.	Occurs in the chloroplast.
Occurs in all organisms.	Occurs in photosynthetic organisms.

45. a) i) The body temperature decreases very rapidly due to a decrease in metabolic rate. The homeostatic set point is then lowered so that the animal maintains a constant body temperature at a lower level than normal. When air temperature falls too low, body temperature decreases very rapidly as control mechanisms fail and body loses a lot of heat.

ii) The animal maintains a constant body temperature over a wider range of environmental temperature, as the temperature control mechanism falls so low body temperature decreases very rapidly due to breakdown of the body's temperature control mechanisms.
b) Reduces food consumption as metabolic rate lowers.
c) Small animals have a larger surface area to volume ratio so lose heat more rapidly.

46. a) i) Water potential is the capacity of a system to lose or gain water while solute potential is a measure of the change in water potential of a system due to presence of solute molecules.

ii) In the leaves water is lost by evaporation (also photosynthesis produces sugars) hence lowering water potential while in the roots there is absorption of water from the soil which increases water potential.

b) i) Root pressure is generated when the endodermal cells actively secrete salts into the xylem tissue creating a low water potential in the xylem. This draws water into the xylem by osmosis which causes a pressure in the roots that pushes water up the xylem.
ii)

- Cells have an impermeable strip of suberin the casparian strip which controls the passage of water into the xylem.
- Infoldings of the cell wall which increases surface area of the cell membrane for transfer of solutes.
- Numerous mitochondria to provide energy for active transport.
- Numerous starch grains in endodermal cells which act as energy source.

#this guide is not the official one

Reference:

1. *Understanding biology by Susan Toole*
2. *Biological science*
3. *Advanced biology by Michael Kent*
4. *Functional approach*
5. *Water and aqueous solutions by Simpkins*