THE SCHOOL FOR EXCELLENCE
UNIT 3 BIOLOGY 2008
COMPLIMENTARY WRITTEN EXAMINATION 1 - SOLUTIONS

SECTION A – MULTIPLE CHOICE QUESTIONS

QUESTION 1 Answer is C
QUESTION 2 Answer is A
QUESTION 3 Answer is B
QUESTION 4 Answer is B
QUESTION 5 Answer is D
QUESTION 6 Answer is A
QUESTION 7 Answer is B
QUESTION 8 Answer is C
QUESTION 9 Answer is B
QUESTION 10 Answer is D
QUESTION 11 Answer is A
QUESTION 12 Answer is A
QUESTION 13 Answer is C
QUESTION 14 Answer is D
QUESTION 15 Answer is B
QUESTION 16 Answer is A
QUESTION 17 Answer is D
QUESTION 18 Answer is C
QUESTION 19 Answer is D
QUESTION 20 Answer is C
QUESTION 21 Answer is B
QUESTION 22 Answer is A
QUESTION 23 Answer is D
QUESTION 24 Answer is B
QUESTION 25 Answer is A

SECTION B: EXTENDED RESPONSE QUESTIONS

QUESTION 1

a. i. Cholesterol

ii. Cholesterol molecules between the phospholipid bilayer makes membranes less fluid at higher temperatures and more stable.

Or, without cholesterol membrane breaks down rapidly and releases it's contents.

Or cholesterol decreases permeability of membrane to some water soluble molecules.

Or maintains fluidity at very low temperatures.

iii. A steroid 4 ring structure.

iv. Insoluble in water therefore would not dissolve in the fluid component of the membrane. Built up from 4 hydrocarbon rings linked together with a hydrocarbon tail at one end and an OH group at the other end. The OH group gives the molecule some polar character.

b. i. Antigens or 'non self' molecules

ii. The immune system of the recipient organism recognises the introduced cells as 'foreign' or 'non self'. The immune system responds with chemical and cellular attacks which kill the 'non self' cells.

QUESTION 2

a. **i.** Carbohydrates are the main source of energy for the body. If an athlete eats a high carbohydrate meal it will be stored as glycogem which is broken down to glucose. Glucose will then be used in cellular respiration and the generation of ATP.

ii. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$

$36\ ADP + 36\ P_i \rightarrow 36\ ATP$

iii. 100 m Sprint: Anaerobic respiration results in 2 ATP/glucose split.

iv. 100 m runner: Lactic acid
Yeast: CO_2 and ethanol

v. Different enzymes in yeast cells and human muscle cells and as a result different end-products are formed.

QUESTION 3

a. **i.** More surface area for the electron transport chain resulting in much greater production of ATP.

ii. Pyruvate
iii. Electron transport chain

b. The condition of a relatively stable internal environment, maintained within narrow limits.

QUESTION 4

a. **i.** An enzyme.

ii. It requires presence of a second messenger protein such as a G protein to transmit the message from the surface membrane receptor into the cytosol. It would then pass through a cascade of events leading to the nucleus and eventually cell division.

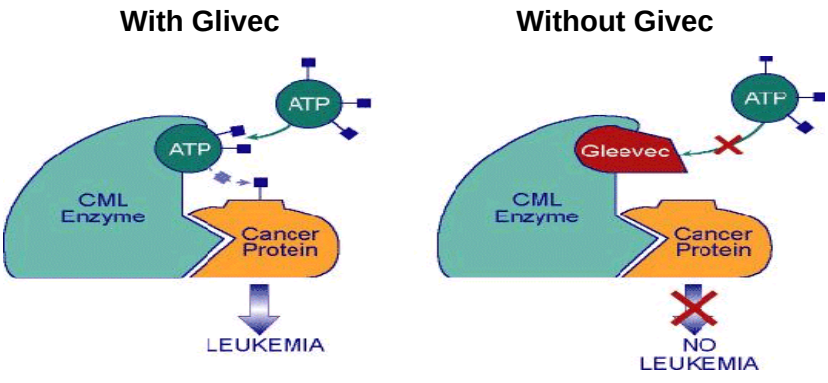
iii. If the sequence of nucleotides in the gene coding for the enzyme was different, a different mRNA could be produced which could be translated into a different order of amino acids. (In actual fact, CML is characterised by a specific chromosomal defect in which a translocation of two genes between chromosomes 22 and 9 occurs. This fusion gene codes for a protein that is tyrosine kinase).

b. The technique in which an active site of a molecule is determined and a second molecule (the drug) is constructed to fit into that active site to inhibit the activity of the first molecule.

c. **i.** Acts as a coenzyme OR provides energy to drive the reaction at the CML enzyme.

ii. A series of steps where a signal outside the cell causes a functional change inside the cell OR Refers to a series of events that occur after the receipt of a specific signal and result in a response OR (better answer for this case) When a signalling molecule (ligand) binds to its receptor, it triggers a series of molecular events. The signal is passed by a secondary messenger molecule to an effector molecule that results in a cellular response. The signal message may be amplified in each successive step, activating more secondary messengers in the next step. Signal pathways may branch to produce multiple responses from the same signal

iii.



iv. Glivec specifically targets the defective pathway which causes the cancer. Other treatments like chemotherapy are harmful to all cells of the body. Harm to healthy cells causes serious side effects such as nausea and loss of hair.

QUESTION 5

a. **i.** A general name for a large group of molecules that are involved in chemical signalling b/w the various cells of the immune system. They are either soluble proteins or glycoproteins.

ii. Paracrine-paracrine signals usually travel short distances by diffusion in the extracellular fluid.

iii. Paracrine because it's chemical signalling between nearby or adjacent cells.

QUESTION 6

a. **i.** Non cellular particles consisting of genetic material surrounded by a protein coat-reproduce only in a host cell.

ii. INTACT skin (VCAA 2007 - Skin alone was not sufficient to obtain a mark)
Mucus , Stomach acid, Saliva, Tears.

iii. Needs to have ribose sugar attached to phosphate base and the base A C U or G

iv. RNA viruses replicate in the nucleus.
Transform their RNA into the equivalent DNA molecule after they infect a cell.
Integrate that DNA into the host cell chromosome and then normally reproduce using the cell material as ingredients.

v. Because HIV destroys a key component of the immune system. T helper cells, patients have greatly reduced defence against other invading organisms and develop a number of opportunistic disease. The virus only infects cells carrying a particular protein marker found mainly on mature helper T cells.

vi. If know that lipids make up 30% of virus-disruption of the HIV-1 lipid surface by certain chemical agents reduces the infectivity of the virus ie disrupt the lipid bilayer+unsuccessful infection. Changing shape of a molecule changes it's function.

vii. Cannot make a live, attenuated vaccine because it is too dangerous (virus mutates frequently).

b. Various answers: Eg Assume infectious so safe hygeine, sterilisation, isolation of patients, travel restriction etc.

QUESTION 7

a.

Orientation of Seed	Direction of Root Growth
C	
D	

b. Geotropism

c. In a horizontal seedling auxin accumulates along the lower horizontal sides of the root. The uneven distribution of auxin in the cells inhibits cell elongation on lower side of root which causes uneven growth of cells-the cells along the upper horizontal part of the root grow faster and hence the root turns downwards towards gravity. Positive geotropism.

d. Various answers. One suggestion is:

1. Cut off the tip of the coleoptile of a plant.
2. Cover the stump with a block of agar.
3. Replace the tip.

Phototropism will take place place normally.

Repeat the experiment at least 5 times (VCAA recommends 5).

Repeat the experiment replacing the agar block with a block of impervious mica between the tip and the stump, phototropism will not occur.