VCE BIOLOGY 2014

YEAR 12 UNIT 3

Topic Test 1 – Molecules of Life

Time allowed: 50 minutes
Total marks: 40

14 Multiple Choice Questions
4 Short Answer Questions

An Answer Sheet is provided for Section A.
Answer all questions in Section B in the space provided.

Learning Materials *by Lisachem*
PO Box 2018, Hampton East, Victoria, 3188
Ph: (03) 9598 4564 Fax: (03) 8677 1725
Email: orders@learningmaterials.com.au or orders@lisachem.com.au
Website: www.learningmaterials.com.au

• ***Biology*** • ***Physics*** • ***Chemistry*** • ***Psychology***

STUDENT NUMBER									Letter
Figures									
Words									

Student Name....……..

VCE Biology 2014 Year 12 Topic Test 1 Unit 3

Molecules of Life

Student Answer Sheet
There are 14 Multiple Choice questions to be answered by circling the correct letter in the table below. Use only a 2B pencil. If you make a mistake, erase and enter the correct answer. Marks will not be deducted for incorrect answers.

Question 1	A	B	C	D	*Question 2*	A	B	C	D
Question 3	A	B	C	D	*Question 4*	A	B	C	D
Question 5	A	B	C	D	*Question 6*	A	B	C	D
Question 7	A	B	C	D	*Question 8*	A	B	C	D
Question 9	A	B	C	D	*Question 10*	A	B	C	D
Question 11	A	B	C	D	*Question 12*	A	B	C	D
Question 13	A	B	C	D	*Question 14*	A	B	C	D

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Molecules of Life

SECTION A – Multiple Choice Questions

Question 1
Cellulose is a polysaccharide manufactured by plants. A polysaccharide manufactured by animals is
A. starch.
B. peptidoglycan.
C. glucose.
D. glycogen.

Question 2
A biomolecule containing the elements C, H, O only in the ratio of 1:2:1 would be a
A. triglyceride.
B. monosaccharide.
C. nucleotide.
D. amino acid.

Question 3
A particular molecule would be classified as organic if it
A. is found in an organism.
B. contains carbon.
C. contains carbon chains or rings, hydrogen and oxygen.
D. is utilised by an organism.

Question 4
Alpha helices are characteristic of which level of protein structure?
A. Primary.
B. Secondary.
C. Tertiary.
D. Quaternary.

Question 5
Which of the following terms do not refer exclusively to lipids?
A. Emulsion.
B. Fat.
C. Oil.
D. Wax.

Question 6
Deoxyribonucleic acid can be found in which locations in a eukaryotic cell?
A. Nucleus only.
B. Nucleus and plastids only.
C. Nucleus, mitochondria and plastids only.
D. Nucleus, mitochondria, plastids and cytosol.

Questions 7, 8 and 9 refer to the diagram below, which represents a plasma membrane.

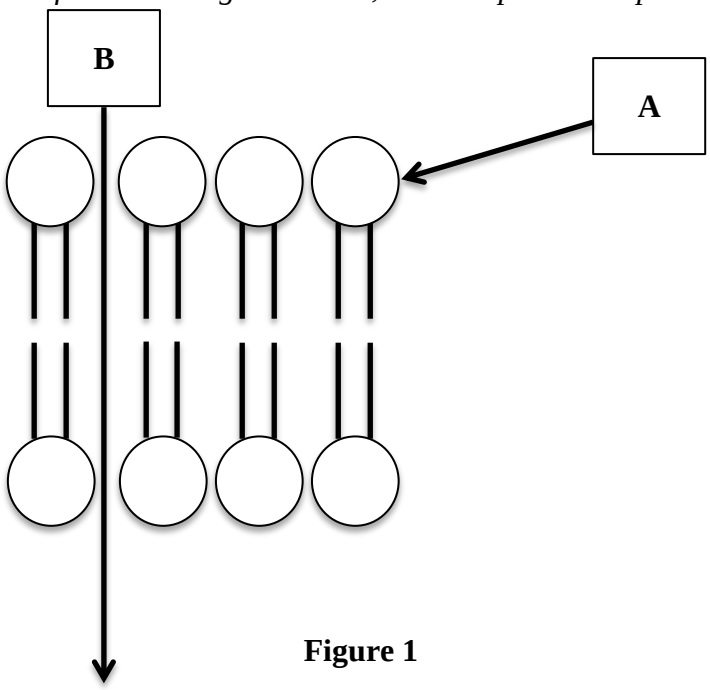

Figure 1

Question 7
Structure A is the
A. hydrophobic head of a phospholipid molecule.
B. hydrophilic head of a phospholipid molecule.
C. amphipathic head of a phospholipid molecule.
D. hydrophobic tail of a phospholipid molecule.

Question 8
Molecule B is shown to pass across the plasma membrane. This molecule would most likely be
A. lipid soluble.
B. water soluble.
C. peptide based.
D. charged.

Question 9
Molecule B would move via the process of
A. active transport.
B. endocytosis.
C. facilitated diffusion.
D. diffusion.

Question 10
A human red blood cell is placed into a hypotonic solution. The result would be that there is
A. no net movement of water into or out of the cell.
B. net movement of water out of the cell, possibly causing the cell to die.
C. net movement of water into the cell causing it to become turgid.
D. net movement of water into the cell, possibly causing it to rupture.

Question 11
A scientist was investigating a particular organelle and noting its main activities. It was seen to contain enzymes that were catalysing the addition or removal of sugars from proteins and also sometimes catalysing the addition of sulfates or phosphate groups to them. Additionally, the organelle seemed to be directing proteins to locations within the cell or to the plasma membrane. This organelle is the
A. rough endoplasmic reticulum.
B. smooth endoplasmic reticulum.
C. golgi body.
D. nucleolus.

Question 12 refers to ***Figure 2***.

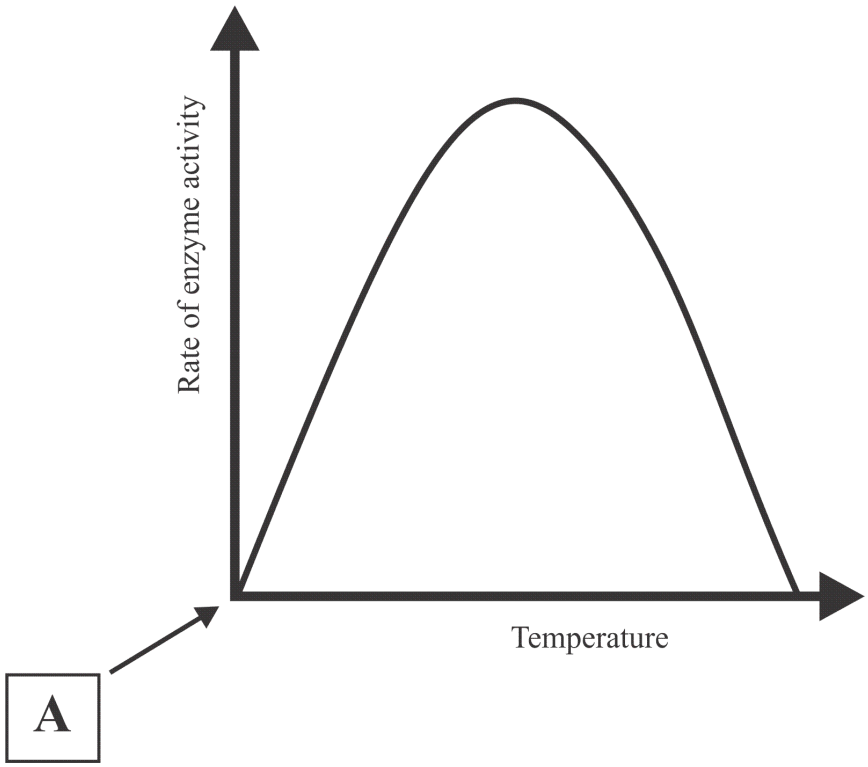

Figure 2

Question 12
At point A on the graph,
A. the enzyme is denatured.
B. the enzyme's active site has been reversibly altered.
C. the enzyme's tertiary structure has not been altered.
D. the enzyme's function is optimal.

Question 13
Chlorophyll is the pigment responsible for the absorption of light in photosynthesis. It is found in the

A. cytoplasm of the cell.
B. granum of the chloroplast.
C. stroma of the chloroplast.
D. outer membrane of the chloroplast.

Question 14
The following reaction: $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$ is

A. anabolic and endergonic.
B. catabolic and endergonic.
C. anabolic and exergonic.
D. catabolic and exergonic.

End of Section A

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Molecules of Life

SECTION B – Short Answer Questions

Question 1 (6 marks)

a. All cells are surrounded by a phospholipid bilayer known as the cell membrane. State two functions of this structure. **2 marks**

_____

_____

_____

b. Explain the function of the following components of cell membranes.

i. Protein channel. **1 mark**

_____

_____

ii. Cholesterol. **1 mark**

_____

_____

iii. Glycoprotein. **1 mark**

_____

_____

c. Some cells contain organelles enveloped by a phospholipid membrane. What is the name given to cells of this type? **1 mark**

_____

Question 2 (7 marks)
Enzymes function as catalysts in cells and organisms.

a. What is a catalyst? **1 mark**

_____

_____

b. What type of biomolecule is an enzyme? **1 mark**

_____

c. Enzymes are often described as having a 'lock and key' relationship with their substrates. Illustrate this in the space provided below, labelling the enzyme, substrate and active site. **3 marks**

d. Explain what happens to the structure of an enzyme when it is denatured and the consequence this has on its function. **2 marks**

_____

_____

_____

Question 3 (6 marks)

a. Write a balanced equation for aerobic cellular respiration. **1 mark**

_____

b. This reaction occurs in three stages. Name each stage and state where it occurs in the cell. **3 marks**

_____

_____

_____

c. Which stage is the most profitable in terms of energy? **1 mark**

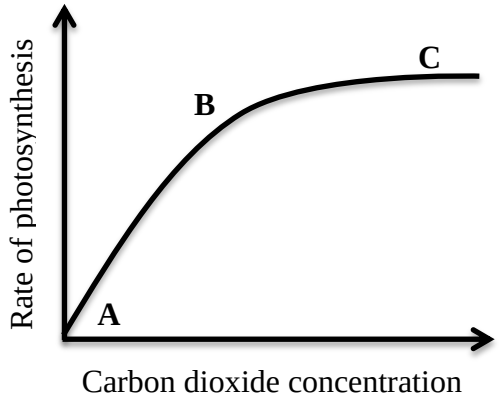
_____

d. Into what molecule does the energy get transferred so that it is available for use in other parts of the cell? **1 mark**

_____

Question 4 (7 marks)

A scientist wanted to investigate the relationship between carbon dioxide concentration and rate of photosynthesis. She placed a plant in varying concentrations of carbon dioxide and measured the subsequent rate of photosynthesis. The results are summarized in the graph below:



a. How might the scientist have measured the rate of photosynthesis? **1 mark**

_____

b. What does the graph indicate about the relationship between photosynthesis and carbon dioxide concentration? **1 mark**

_____

_____

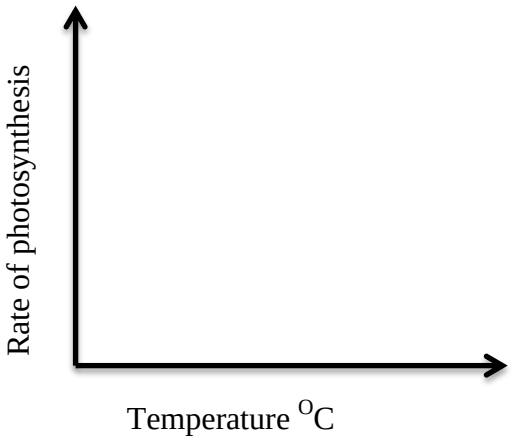
c. What is happening to the rate of photosynthesis at point C? Explain why this occurs. **2 marks**

_____

_____

_____

d. Using the axes provided below, draw a graph illustrating the relationship between temperature and rate of photosynthesis. **1 mark**



e. Explain how the energy from light is utilised in the process of photosynthesis. **2 marks**

_____

_____

_____

_____

End of Section B

End of Topic Test 1

Suggested Answers

VCE Biology 2014 Year 12 Topic Test 1 Unit 3

Molecules of Life

SECTION A – Multiple Choice Answers

1. D	**2.** B	**3.** C	**4.** B	**5.** A	**6.** C	**7.** B
8. A	**9.** D	**10.** D	**11.** C	**12.** C	**13.** B	**14.** A

SECTION B – Short Answer (Answers)

Question 1 (6 marks)

a. Any **two** for **(2 marks)**
- controls movement of molecules in and out of the cell
- separates internal and external environments of the cell
- helps to maintain cell structure
- involvement in cell signalling
- involvement in establishment of self via MHC markers

b. **i.** Allows facilitated diffusion of substances such as ions and polar molecules into or out of the cell, that are unable to diffuse through the phospholipid membrane **(1 mark)**.

ii. Maintains the correct fluidity of the membrane **(1 mark)**.

iii. Involved in cell signalling **(1 mark)**.

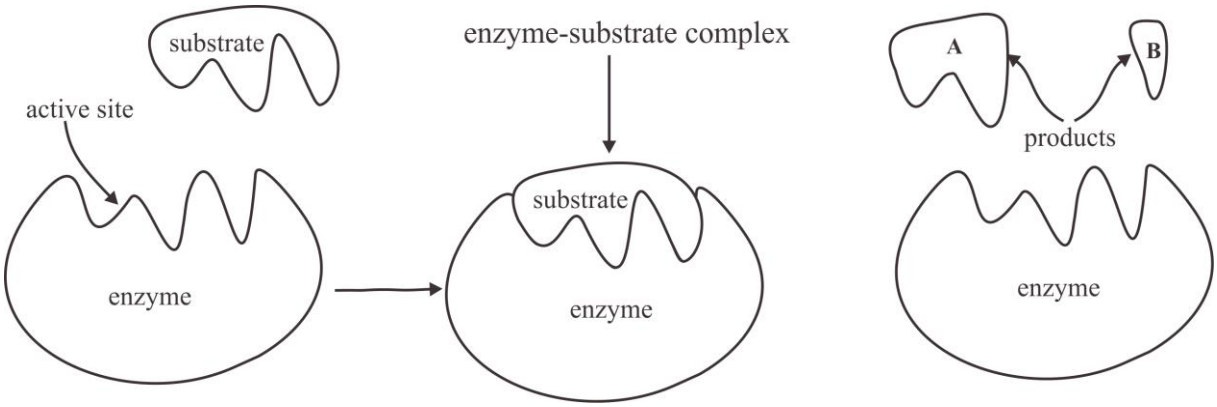
c. Eukaryotic **(1 mark)**.

Question 2 (7 marks)

a. A molecule that lowers the activation energy of a chemical reaction **(1 mark)**.

b. A protein **(1 mark)**.

c.



(3 marks)

d. When an enzyme is denatured, the bonds in the tertiary structure are broken and the shape of the active site is changed **(1 mark)**. This means that the enzyme can no longer effectively bind to the substrate and thus its catalytic function is lost **(1 mark)**.

Question 3 (6 marks)

a. $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O + energy$ **(1 mark)**.

b. First stage – Glycolysis – cytosol **(1 mark)**.
Second stage – Krebs cycle – mitochondrial matrix **(1 mark)**.
Third stage – Electron transport chain - inner membrane of the mitochondria **(1 mark)**.

c. The third stage – The electron transport chain **(1 mark)**.

d. Adenosine triphosphate or ATP **(1 mark)**.

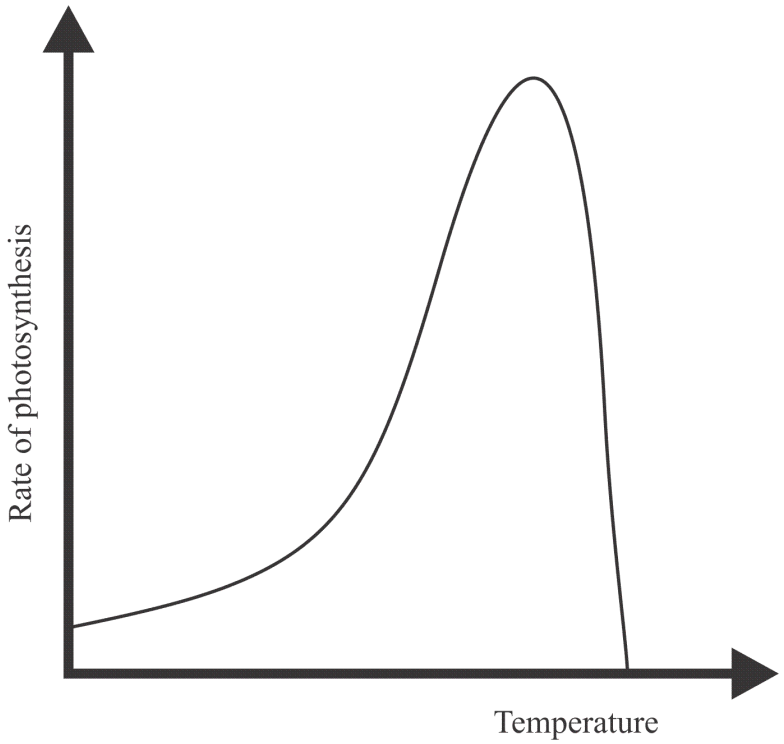
Question 4 (7 marks)

a. Measure the rate of oxygen production **or** the rate of carbon dioxide consumption. **(1 mark)**.

b. As the carbon dioxide concentration increases, so does the rate of photosynthesis up to a certain point (point C on the graph). After this point the rate of photosynthesis does not increase as carbon dioxide increases **(1 mark)**.

c. There is a limiting factor, such as availability of water or the number of chloroplasts, **(1 mark)** thus the rate of photosynthesis stops increasing because these factors are not increasingly available as is carbon dioxide **(1 mark)**.

d.



(1 mark)

e. The light energy is used in the light dependent stage of photosynthesis to produce protons and high energy electrons **(1 mark)**. These drive the production of ATP and NADPH in the light independent reaction, as well as directly entering the electron transport chain **(1 mark)**.

End of Suggested Answers