
BIOLOGY VCE UNITS 3&4 DIAGNOSTIC TOPIC TESTS 2017

TEST 1: PLASMA MEMBRANES, NUCLEIC ACIDS AND PROTEINS

TOTAL 40 MARKS (45 MINUTES)

Student's Name: _____ Teacher's Name: _____

Directions to students

Write your name and your teacher's name in the spaces provided above.
Answer all questions in the spaces provided.

SECTION A – MULTIPLE-CHOICE QUESTIONS

Instructions for Section A

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1; an incorrect answer scores 0.

Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale.

Question 1

DNA belongs to a group of biomacromolecules called

- A. carbohydrates.
- B. nucleic acids.
- C. lipids.
- D. proteins.

Question 2

The monomers of proteins are

- A. simple sugars (glucose).
- B. nucleotides.
- C. fatty acids.
- D. amino acids.

Question 3

Amino acids are carried to the ribosome by

- A. tRNA.
- B. rRNA.
- C. mRNA.
- D. DNA.

Question 4

The nucleotide sequence A G U G A C A A could represent

- A. part of the DNA template of a particular gene.
- B. the amino acid chain of a polypeptide.
- C. a sequence of mRNA.
- D. a section of double helix.

Question 5

A proteome is defined as

- A. the sum of all of the functional proteins that an individual organism produces.
- B. a primitive, simple form of protein.
- C. the kinds of proteins produced by prokaryotic organisms.
- D. the kinds of proteins produced by eukaryotic organisms.

Question 6

The bonds linking amino acids together are called

- A. peptide bonds.
- B. hydrogen bonds.
- C. intermolecular bonds.
- D. covalent bonds.

Question 7

Unlike RNA, DNA has

- A. an uracil base.
- B. a sugar called ribose.
- C. two strands of nucleotides.
- D. a phosphate group in its nucleotides.

Question 8

Some students have been cleaning up in the Biology laboratory. In one of the cupboards they find a mess of Petri dishes. A strange growth is pushing out through the lids of one of the Petri dishes. They investigate the growth and determine its nature.

As a part of the investigation of this strange organism, a drop of distilled water is placed on a slide with a sample of the organism.

It is noticed that the cells of the organism

- A. swell as water moves from areas of high solute concentration to areas of low solute concentration.
- B. shrink as solutes moves from areas of low solute concentration to areas of high solute concentration.
- C. swell as water moves from areas of low solute concentration to areas of high solute concentration.
- D. shrink as solutes moves from areas of high solute concentration to areas of low solute concentration.

Question 9

Which of the following factors would tend to increase membrane fluidity?

- A. low temperature
- B. a relatively high protein content in the membrane
- C. a low proportion of cholesterol lipids in the membrane
- D. a greater proportion of saturated phospholipids in the membrane

Question 10

Cells produce proteins which are required elsewhere in the body.

The process of protein formation and transport involves which sequence?

- A. vesicles; ribosomes; endoplasmic reticulum; Golgi apparatus; exocytosis
- B. endoplasmic reticulum; ribosomes, Golgi apparatus; vesicles, exocytosis
- C. ribosomes; endoplasmic reticulum; Golgi apparatus; vesicles, endocytosis
- D. ribosomes; endoplasmic reticulum; Golgi apparatus; vesicles, exocytosis

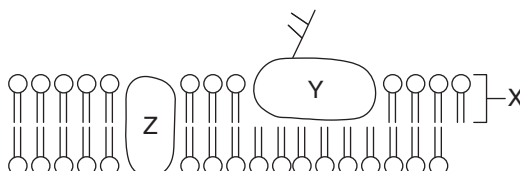
SECTION B – SHORT-ANSWER QUESTIONS

Instructions for Section B

Answer **all** questions in the spaces provided. Write using blue or black pen.
Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale.

Question 1 (8 marks)

The diagram below shows part of a cell membrane.



a. Label the structures.

i. X 1 mark

ii. Y 1 mark

iii. Z 1 mark

b. State the function of the structures.

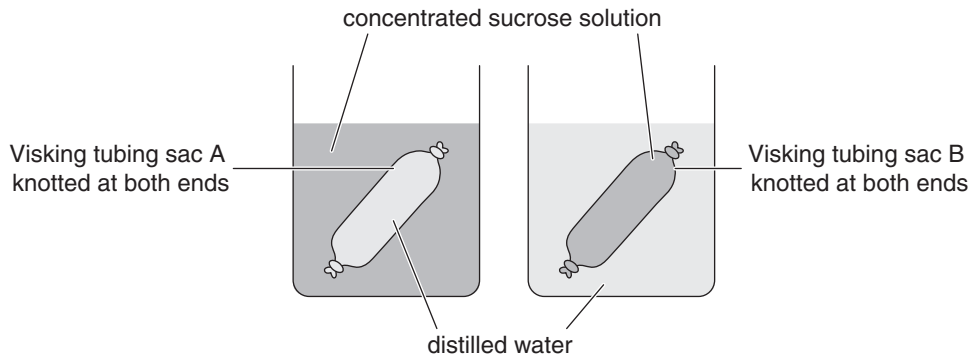
i. Y 1 mark

ii. Z 1 mark

c. Explain how the physical properties of phospholipid molecules contribute to the formation of cell membranes. Include a diagram in your answer. 3 marks

Question 2 (3 marks)

A Visking tubing sac (A) was filled with distilled water. Another was filled with concentrated sucrose solution (B). They were then placed in beakers as shown in the diagram below. After one hour they were removed from their beakers and checked to see if they had changed in any way.



a. What special property does Visking tubing have? 1 mark

b. What would you expect each sac to be like after an hour in the liquid in the beaker? Give reasons behind any suggestion you make. 2 marks

Question 3 (3 marks)

a. In the space below, draw and label the generic structure of a nucleotide. 1 mark

b. Name two types of nucleic acids and the differences between them. 2 marks

Question 4 (5 marks)

An organism has a template DNA strand sequence of bases:

T A T A T A C G G G C G A T G A C T C A T A G G

- a.** Write the complementary RNA base sequence. 1 mark

- b.** How many amino acids does this piece of DNA code for? 1 mark

- c.** This sequence of bases is part of the genetic code for the production of a protein.
Which organelles are the sites of protein synthesis? 1 mark

- d.** Proteins are polypeptides, assembled from amino acid monomers.
Use diagrams to demonstrate the formation of a peptide bond. Include all products of the reaction in your diagram. 2 marks

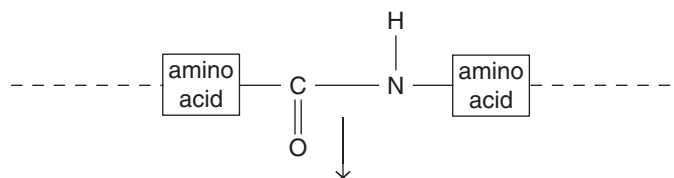
Question 5 (3 marks)

- a. Name three functions of proteins and provide examples. 2 marks

- b. Amino acids are the building blocks of proteins.
What is the structural difference between different amino acids? 1 mark

Question 6 (2 marks)

The diagram below represents two amino acids joined together in part of a protein chain.

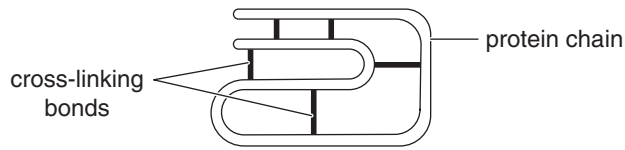


- a. Explain what happens to the bond between the amino acids if it is hydrolysed. 1 mark

- b. Explain why the joining together of amino acids into a protein chain is called condensation polymerisation. 1 mark

Question 7 (2 marks)

The diagram below represents a protein molecule.

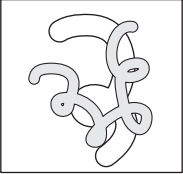
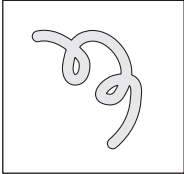
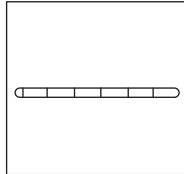
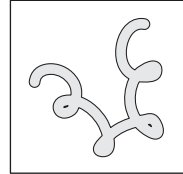


a. Draw the molecule as it might look after being denatured. 1 mark

b. The protein albumen in egg white can be denatured by whisking (beating).
 State one other way of denaturing a protein. 1 mark

Question 8 (4 marks)

Look carefully at the diagrams in boxes **A.**, **B.**, **C.**, **D.** and then at the text in boxes **W.**, **X.**, **Y.** and **Z.** below.
 Place the letter for each into the table so that they correspond to the correct level of protein structure.

A.		B.	
C.		D.	
W.	polypeptide chain folds on itself to form a 3D structure	X.	amino acids become joined by peptide bonds to form a polypeptide
Y.	two or more polypeptide chains become entwined and chemically bonded together	Z.	polypeptide chain becomes coiled or pleated

Level of structure	Diagram (A–D)	Diagram (W–Z)
primary		
secondary		
tertiary		
quaternary		