



# **BIOLOGY 2017**

## **Unit 3**

### **Key Topic Test 2 – Nucleic acids and proteins**

Recommended writing time\*: 45 minutes

Total number of marks available: 45 marks

## **SOLUTIONS**

**SECTION A: Multiple-choice questions (1 mark each)**

**Question 1**

*Answer:* D

*Explanation:*

DNA contains the instructions to produce proteins

**Question 2**

*Answer:* A

*Explanation:*

The whole set of proteins produced by a cell is called its proteome.

**Question 3**

*Answer:* B

*Explanation:*

Alpha helices and pleated sheets are part of a protein's secondary level of structure

**Question 4**

*Answer:* C

*Explanation:*

When amino acids join to form a dipeptide a peptide bond is formed via a condensation polymerisation reaction

**Question 5**

*Answer:* D

*Explanation:*

X represent a phosphate group, Y represents a sugar and Z represents a nitrogenous base

**Question 6**

*Answer:* C

*Explanation:*

Both DNA and RNA contain a negatively charged phosphate groups.

**Question 7**

*Answer:* D

*Explanation:*

tRNA brings the correct amino acid to the ribosome

**Question 8**

*Answer:* B

*Explanation:*

Stage 1 occurs in the nucleus and is called transcription

**Question 9**

*Answer:* B

*Explanation:*

F is a growing polypeptide chain

**Question 10**

*Answer:* A

*Explanation:*

Q represents messenger RNA

**SECTION B: Short-answer questions****Question 1****a.**

<b>Types of protein</b>	<b>Function</b>	<b>Example</b>
Structural	provide structural support to cells	Actin
Enzymes	catalyse biochemical reactions	Amylase
Transport	transport of substances	Haemoglobin
Hormones	coordination of organism	Insulin

8 marks

- b.** The proteome is the entire set of proteins expressed by an organism or a cell (1 mark).  
Scientists are interested in studying the proteome as proteins usually interact with each other(1 mark)

2 marks

Total 10 marks

**Question 2****a.****i.** secondary structure**ii.** X: alpha helix            Y: B-pleated sheet**iii.** Quarternary structure**iv.** Primary structure (1 mark) will affect the overall function negatively as the 3D tertiary structure will be affected and this could render the protein useless (1 mark)

1 + 2 + 1 + 2 = 6 marks

- b.** Will prevent protein synthesis (1 mark) and therefore biochemical processes will be stopped (1 mark)

2 marks

Total 8 marks

**Question 3**

**a.**

**i.** Asparagine – glycine – proline – glycine - serine

**ii.**

	<b>DNA</b>	<b>RNA</b>
<b>No. of strands</b>	2	1
<b>Sugar</b>	deoxyribose	ribose
<b>Bases</b>	adenine thymine guanine cytosine	adenine uracil guanine cytosine

**iii.** because it is the same in all organisms

1 + 6 + 1 = 8 marks

**b.**

**i.** pre-mRNA

**ii.** 5' cap is added and a poly A tail is added to the 3' end (1 mark). Introns are removed and exons are joined back together (1 mark)

1 + 2 = 3 marks

Total 11 marks

**Question 4**

a. amino acids

1 mark

b. condensation polymerisation (1 mark) water is a by-product (1 mark)

2 marks

c.

<b>Form of RNA</b>	<b>Function</b>
mRNA	convey genetic information from DNA to ribosome
tRNA	brings the correct amino acid to the ribosome
rRNA	synthesises proteins

3 marks

Total 6 marks