

# DNA & Protein Synthesis

## Question Paper 7

<b>Level</b>	A Level
<b>Subject</b>	Biology
<b>Exam Board</b>	Edexcel
<b>Topic</b>	Biological Molecules
<b>Sub Topic</b>	DNA & Protein Synthesis
<b>Booklet</b>	Question Paper 7

**Time Allowed:** 65 minutes

**Score:** /54

**Percentage:** /100

**Grade Boundaries:**

A*	A	B	C	D	E	U
>85%	77.5%	70%	62.5%	57.5%	45%	<45%

1 One role of the skin is to protect the body from infection.

(a) (i) Explain how skin flora protect the body from infection.

(2)

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(ii) The skin produces lipids that protect the body from infection.

Place a cross ☒ in the box next to the correct explanation of how these lipids protect the body from infection.

(1)

- A they are alkalis that kill bacteria
- B they have antimicrobial properties that inhibit the growth of bacteria
- C they are enzymes that destroy viruses
- D they are water soluble and prevent viruses from replicating

(b) The skin contains a fibrous protein. This protein forms a barrier to the entry of microorganisms.

(i) Place a cross ☒ in the box next to the name of this protein.

(1)

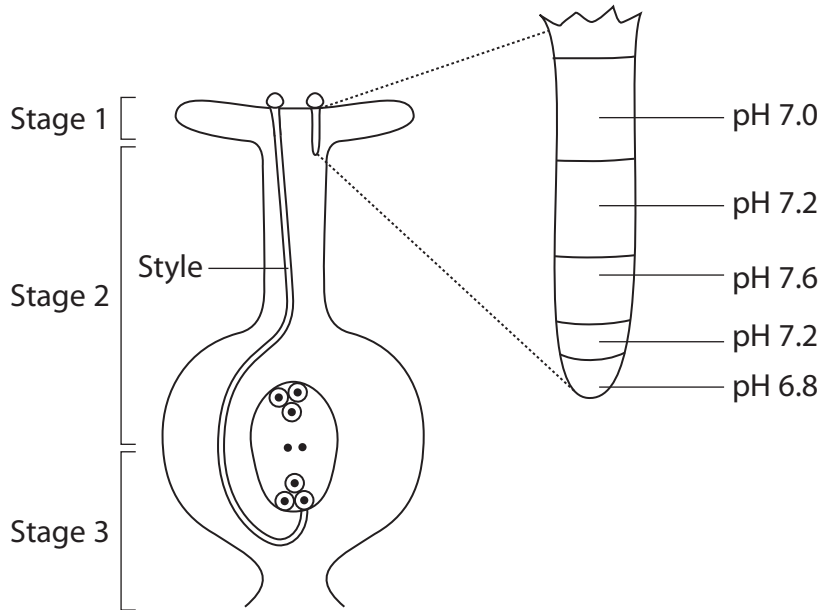
- A cytokine
- B interferon
- C keratin
- D lysozyme



2 Sexual reproduction in plants includes the transfer and fusion of gametes.

The diagram below shows part of a flower with two pollen grains and their pollen tubes.

The diagram also shows an enlargement of one of the pollen tubes and the pH of the cytoplasm in each region of this tube.



(a) At stage 1, the pollen grain contains the haploid generative nucleus.  
Explain what is meant by the term **haploid nucleus**.

(2)

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(b) Describe the changes in the pH of the pollen tube shown in the diagram.

(2)

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(d) During stage 3, the generative nucleus divides to form two male nuclei and the pollen tube fuses with the embryo sac.

Describe what happens to each of these two male nuclei.

(2)

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**(Total for Question 2 = 11 marks)**

3 Human immunodeficiency virus (HIV) causes the condition known as acquired immunodeficiency syndrome (AIDS) in humans.

(a) Complete the following table by placing a tick (✓) in the correct column next to each statement to show whether it is true or false.

(3)

Statement	True	False
HIV infects b-lymphocytes in the human immune system		
The genetic material in HIV is a form of RNA		
The enzyme, reverse transcriptase, is used by HIV		

(b) Following infection by HIV, the genetic material will be copied as the virus reproduces. A single virus reproduces at a very fast rate giving rise to billions of viruses in just one day.

During reproduction of HIV, many genetic mutations are produced. This means that many new strains of HIV can develop quickly within an infected person.

(i) Explain what is meant by the term **genetic mutation**.

(2)

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- (ii) Suggest why effective treatment of HIV in human populations will require the continual development of a mixture of many new drugs.

(4)

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**(Total for Question 3 = 9 marks)**









5 DNA and lipids are important molecules found in living organisms.

(a) A triglyceride is one type of lipid.

For each of the descriptions below, put a cross (☒) in the box that corresponds to the correct statement about lipids or triglycerides.

(i) Triglycerides are composed of:

(1)

3 glycerol molecules and 3 fatty acid molecules

1 glycerol molecule and 3 fatty acid molecules

1 glycerol molecule and 1 fatty acid molecule

3 glycerol molecules and 1 fatty acid molecule

(ii) The bond between a glycerol molecule and a fatty acid molecule is:

(1)

A glycosidic bond

A peptide bond

A phosphodiester bond

An ester bond

(iii) This bond is formed by:

(1)

Hydrolysis

Condensation

A chain reaction

An automatic reaction

(iv) Unsaturated lipids:

(1)

Do not have any double bonds

Have double bonds only between carbon atoms

Have double bonds between carbon atoms and between carbon and oxygen atoms

Have double bonds only between carbon and oxygen atoms

(v) Saturated lipids have:

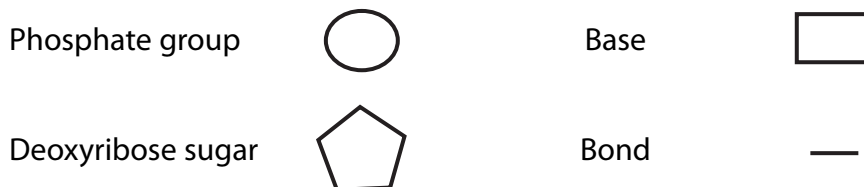
(1)

- More hydrogen atoms than unsaturated lipids
- Fewer hydrogen atoms than unsaturated lipids
- The same number of hydrogen atoms as unsaturated lipids
- No hydrogen atoms

(b) DNA is a double-stranded molecule composed of mononucleotides.

(i) In the space below, draw a diagram to show **two** mononucleotides joined together in a **single** strand of DNA (polynucleotide). Use the symbols shown below for each component in your diagram.

(3)



(ii) Name an enzyme involved in DNA replication.

(1)