

CANDIDATE  
NAME

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CENTRE  
NUMBER

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**BIOLOGY**

**9700/23**

Paper 2 Structured Questions AS

**May/June 2015**

**1 hour 15 minutes**

Candidates answer on the Question Paper.

No Additional Materials are required.

**READ THESE INSTRUCTIONS FIRST**

Write your Centre number, candidate number and name in the spaces at the top of the page.

Write in dark blue or black pen.

You may use an HB pencil for any diagrams or graphs.

Do not use staples, paper clips, glue or correction fluid.

**DO NOT WRITE IN ANY BARCODES.**

Answer **all** questions.

Electronic calculators may be used.

You may lose marks if you do not show your working or if you do not use appropriate units.

At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.

This document consists of **13** printed pages and **3** blank pages.

Answer **all** the questions.

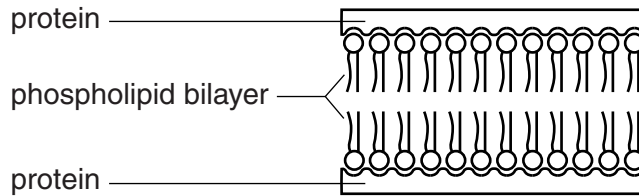
1 The cell surface membrane has a fluid mosaic structure.

(a) Describe what is meant by the term *fluid mosaic*.

.....  
.....  
.....  
.....[2]

(b) In 1934, the biologists Davson and Danielli published their suggestion for the structure of the cell surface membrane, as shown in Fig. 1.1.

They suggested that the membrane was a phospholipid bilayer with a layer of hydrophilic protein on both surfaces.



**Fig 1.1**

State **one** way in which the Davson-Danielli structure is similar to the fluid mosaic structure **and one** way in which it differs from the fluid mosaic model.

*similarity*

.....  
.....[1]

*difference*

.....  
.....[1]

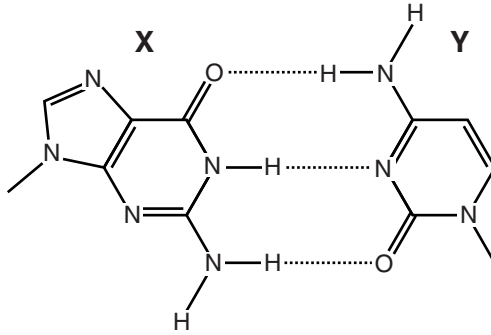


2 DNA replication is an important event in the cell cycle.

(a) State when, during the cell cycle, DNA replication occurs.

.....[1]

(b) Fig. 2.1 shows pairing between two bases, **X** and **Y**, in a DNA molecule.



**Fig. 2.1**

(i) Name the type of bond shown by the dotted lines between the bases.

.....[1]

(ii) State which base, **X** or **Y**, is a pyrimidine **and** explain your answer.

.....  
 .....[1]

(c) The compound benzopyrene, found in tar from tobacco smoke, can become chemically changed in cells and interferes with DNA replication, causing gene mutations.

(i) State what is meant by the term *gene mutation*.

.....  
 .....  
 .....  
 .....  
 .....  
 .....[2]

- (ii) Mutations that occur in dividing cells of the gas exchange system may result in lung cancer.

Suggest the differences in the cell cycle of a cancer cell compared with that of a normal cell of the same type.

.....

.....

.....

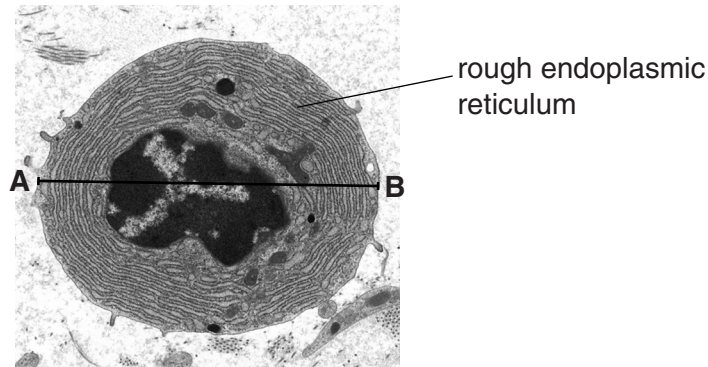
.....

.....[2]

[Total: 7]

3 Fig. 3.1 is an electron micrograph of a type of B-lymphocyte called a plasma cell.

Plasma cells secrete antibody molecules.



**Fig. 3.1**

(a) Suggest why plasma cells contain a large quantity of rough endoplasmic reticulum.

.....  
 .....  
 .....  
 .....  
 ..... [2]

(b) The diameter **A – B** of the plasma cell in Fig. 3.1 is 15 μm.

Calculate the magnification of Fig. 3.1.

Show your working.

magnification × ..... [2]

(c) Smallpox was the first disease to be eradicated by vaccination. The vaccine was effective for up to 10 years after one dose and did not require boosters within this time.

Name the causative organism (pathogen) of smallpox.

..... [1]









5 Fig. 5.1 is a light micrograph of some unicellular photosynthetic organisms called *Chlamydomonas*.

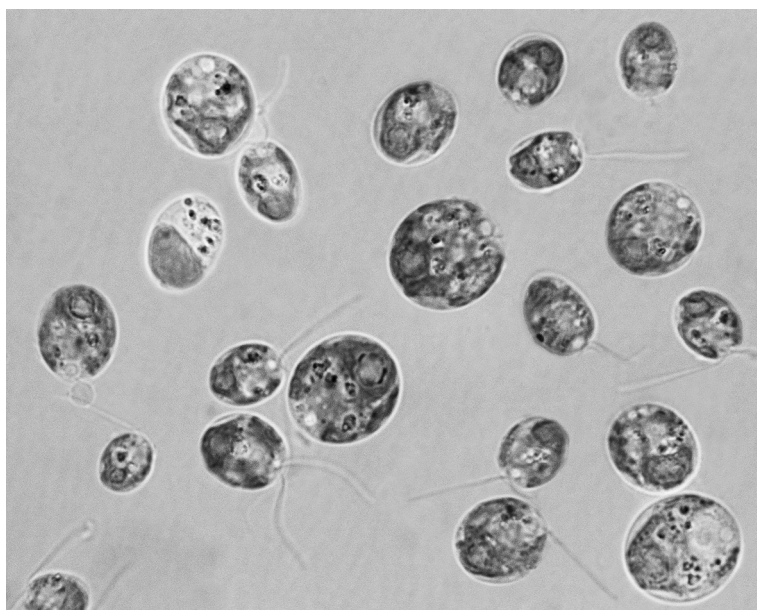


Fig. 5.1

(a) *Chlamydomonas* moves through water.

Explain why the light microscope rather than the electron microscope is used to observe the movement of *Chlamydomonas*.

.....  
.....  
.....  
.....  
.....[2]

(b) *Chlamydomonas* live in water and obtain minerals, such as magnesium ions, from the water.

(i) State **one** role of magnesium ions in photosynthetic organisms.

.....  
.....[1]

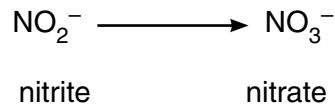
(ii) State two properties of water which make it possible for organisms such as *Chlamydomonas* to live in water.

1 .....  
.....  
2 .....  
..... [2]



- 6 In the oceans, parts of the nitrogen cycle involve different bacteria from those that are involved on the land.

A bacterium found in oceans is *Nitrococcus mobilis*, which carries out the following step in the nitrogen cycle:



- (a) (i) Name the stage in the nitrogen cycle in which this step occurs.

.....[1]

- (ii) Describe how nitrogen in nitrate can be returned to the atmosphere in the form of nitrogen gas.

.....  
 .....  
 .....  
 .....  
 .....  
 .....[2]

(b) Phytoplankton are microscopic photosynthetic organisms that are the main producers in ocean ecosystems. Their habitat is the upper layers of the oceans where sunlight can penetrate through the water.

Define the terms:

(i) ecosystem

.....  
.....  
.....[2]

(ii) producer

.....  
.....  
.....[1]

(iii) habitat.

.....  
.....  
.....[1]

[Total: 7]





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