UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS
General Certificate of Education
Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

5392760373

BIOLOGY **9700/23**

Paper 2 Structured Questions AS **October/November 2013**

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 provided at the top of this page.
Write in dark blue or black ink.
You may use a soft pencil for any diagrams, graphs or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
Electronic calculators may be used.
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 **12** printed pages.

© UCLES 2013

UNIVERSITY of CAMBRIDGE International Examinations

Answer **all** the questions

For Examiner's Use

1 Fig. 1.1 is a diagram of an antibody molecule.

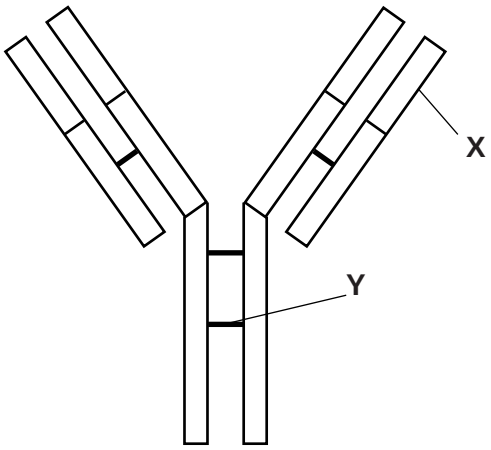


Fig. 1.1

(a) (i) Name the part labelled **X**.

..... [1]

(ii) Name the bond labelled **Y**.

..... [1]

(iii) The antibody molecule in Fig. 1.1 has quaternary structure.

Explain the meaning of the term *quaternary structure* as applied to proteins.

.....

.....

..... [1]

(b) When a pathogen enters the body, a primary immune response occurs. This response includes the production of antibodies.

For Examiner's Use

Describe the stages in the immune response that lead to antibody being produced against a specific antigen.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(c) Vaccination was used in the eradication of smallpox.

Explain, in terms of antigens, why it has not been possible to do the same for malaria.

.....

.....

.....

.....

.....

..... [2]

[Total: 9]

© UCLES 2013

[Turn over

For Examiner's Use

2 **(a)** Bacteria in root nodules of leguminous plants carry out nitrogen fixation.

Describe how nitrogen that is available to these bacteria can eventually become part of animal protein.

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [5]

(b) Fig. 2.1 shows the base sequence of a DNA triplet code used to produce mRNA. Fill in the corresponding tRNA anticodon in the space provided.

DNA triplet	**T A C**
tRNA anticodon	

[1]

Fig. 2.1

(c) More mRNA molecules than tRNA molecules are synthesised in cells.

Suggest a reason for this.

.....

.....

.....

..... [1]

© UCLES 2013

(d) Describe the role of ribosomes in protein synthesis.

For Examiner's Use

.....

.....

.....

.....

.....

.....

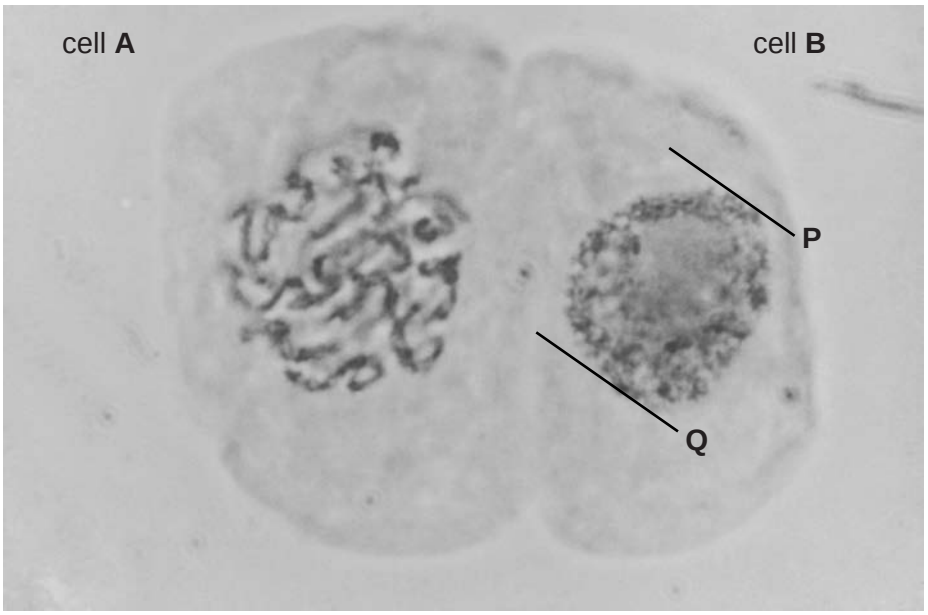
.....

..... [3]

[Total: 10]

3 Fig. 3.1 is a photomicrograph of two animal cells, **A** and **B**, at different stages of the mitotic cell cycle.

For Examiner's Use



magnification × 5000

Fig. 3.1

(a) (i) For each cell, state the name of the stage of the cell cycle shown in Fig. 3.1.

cell **A** .....

cell **B** ..... [2]

(ii) Describe the events that occur during the stage of the cell cycle named for cell **A** in **(a)(i)**.

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

(b) The magnification of Fig. 3.1 is ×5000.

Calculate the diameter of the nucleus of cell **B** between lines **P** and **Q**.

Show your working and give your answer to the nearest micrometre (μm).

For Examiner's Use

answer ..... μm [2]

(c) State the advantages of light microscopy, rather than electron microscopy, for studies of the cell cycle.

.....

.....

.....

.....

.....

.....

.....

..... [3]

[Total: 11]

4 Fig. 4.1 is a diagram of a section through a mammalian heart.

For Examiner's Use

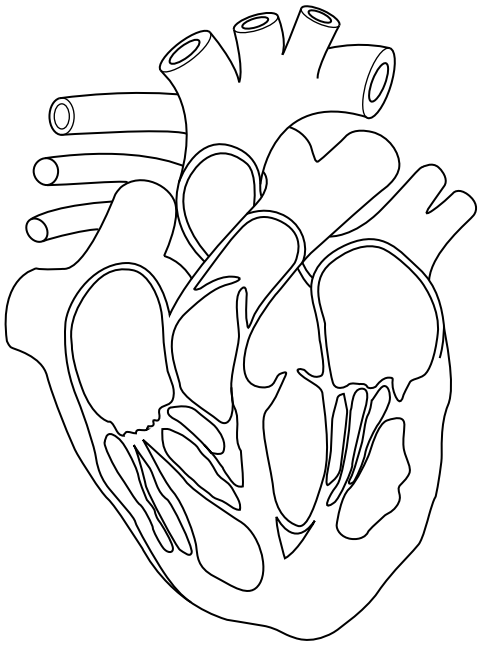


Fig. 4.1

(a) Use a label line and the appropriate letter to label each of the following on Fig. 4.1:

W right atrium

X tricuspid valve

Y aorta.

[3]

(b) Starting from the left ventricle, describe the route taken by the blood as it travels to the lungs.

.....

.....

.....

.....

.....

.....

..... [3]

© UCLES 2013

(c) Describe **and** explain how the structure of the human **gas exchange surface** is adapted for maximum efficiency.

For Examiner's Use

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... [4]

[Total: 10]

5 **(a)** Describe the structure of a cellulose molecule **and** explain how cellulose is a suitable material for the cell walls of plants.

For Examiner's Use

description

.....

.....

.....

.....

.....

explanation

.....

.....

.....

.....

..... [4]

Animals do not have the ability to produce enzymes to digest cellulose. Most herbivores have bacteria in their digestive systems that can digest cellulose.

Fig. 5.1 shows the results of a study on 24 different herbivores. The percentage of cell wall material that was digested by each animal was determined. The time taken for the plant material to pass through the digestive system, the retention time, was also recorded.

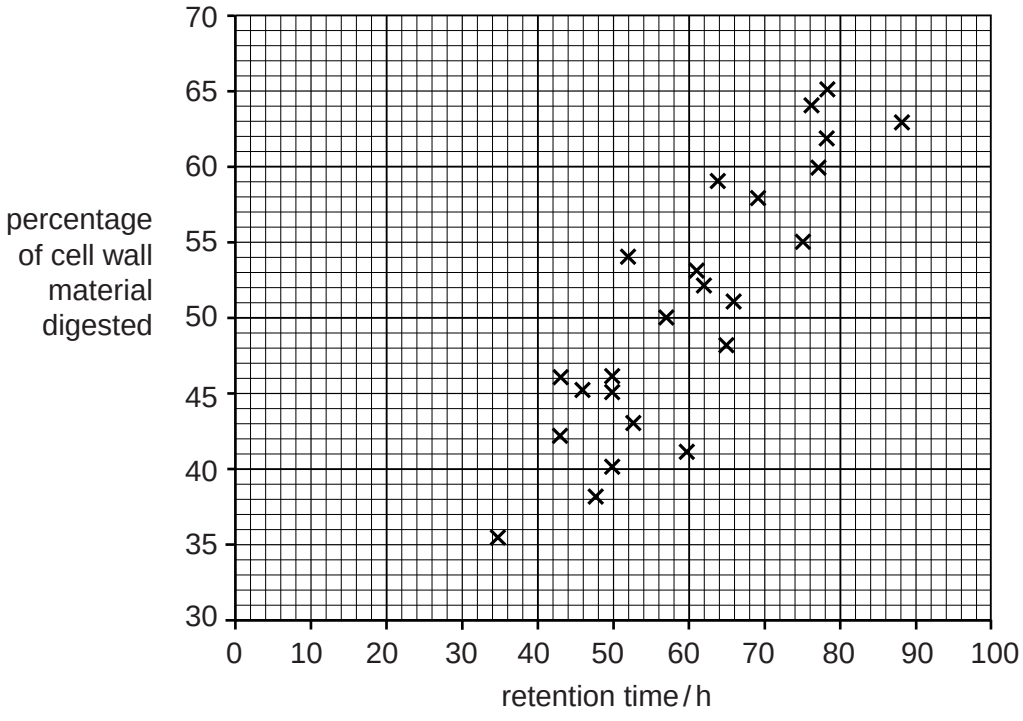


Fig. 5.1

(b) **(i)** With reference to Fig. 5.1, describe the results of this study.

For Examiner's Use

.....

.....

.....

.....

.....

.....

.....

..... [3]

(ii) Explain, in terms of energy flow in ecosystems, the importance of the results in Fig. 5.1.

.....

.....

.....

.....

..... [2]

(c) Digested material in animals is absorbed using both facilitated diffusion and active transport.

State two similarities **and** two differences between facilitated diffusion and active transport.

similarities:

1. .....

2. .....

differences:

1. .....

2. .....

[4]

[Total: 13]

Question 6 starts on page 12

6 Fig. 6.1 is a photomicrograph of phloem sieve tubes from a plant stem.

For Examiner's Use

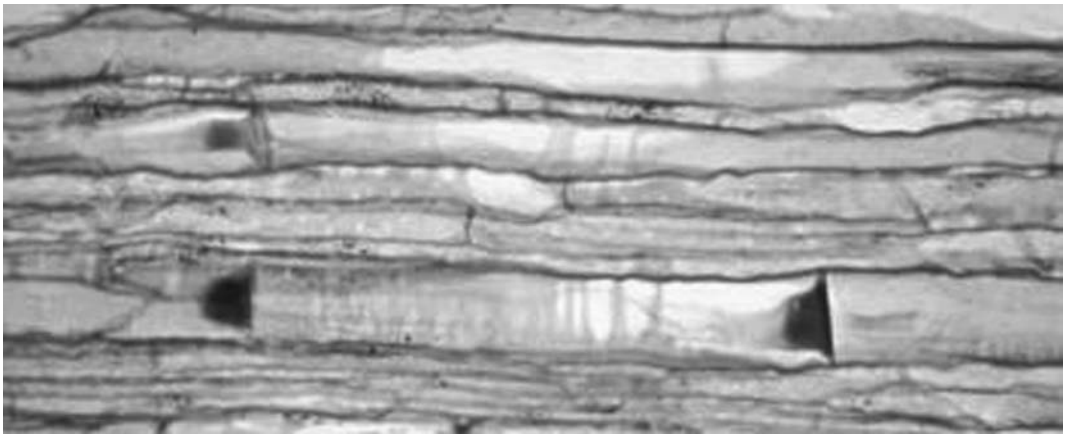


Fig. 6.1

(a) State two features, **visible in Fig. 6.1**, which distinguish sieve tubes from xylem vessels.

1. .....

2. .....
[2]

(b) Explain briefly how sucrose is **moved**, or translocated, **through** sieve tubes.

.....

.....

.....

..... [2]

(c) Some enzymes are found in phloem tissue.
Describe how enzymes catalyse reactions.

.....

.....

.....

.....

.....

.....

..... [3]
[Total: 7]

Copyright Acknowledgements:

Fig. 3.1 and Fig. 6.1 © BIOPHOTO ASSOCIATES/SCIENCE PHOTO LIBRARY.

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

University of Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.