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

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

* 2 6 7 9 2 7 1 4 0 8 *

BIOLOGY **9700/02**

Paper 2 Structured Questions AS **May/June 2008**

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 on all the work you hand in.
Write in dark blue or black pen.
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.
At the end of the examination, fasten all your work together.
The number of marks is given in brackets [ ] at the end of each question or part question.

For Examiner's Use	
1	
2	
3	
4	
5	
6	
Total	

This document consists of **15** printed pages and **1** blank page.

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Answer **all** the questions.

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1 Fig. 1.1 shows the heart and associated blood vessels.

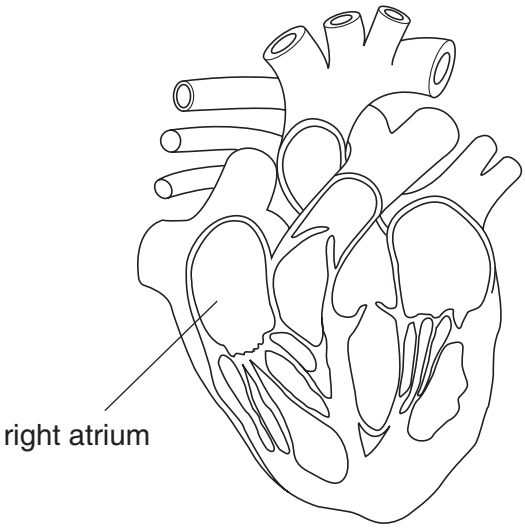


Fig. 1.1

(a) On Fig. 1.1, draw label lines and use the letters **P**, **Q** and **R** to indicate the following structures:

P a blood vessel that carries deoxygenated blood

Q a structure that prevents backflow into a ventricle

R a blood vessel that carries blood at high pressure [3]

(b) The changes in blood pressure in the right atrium are the same as those in the left atrium. The changes in blood pressure in the right ventricle are different from those in the left ventricle.

Explain why this is so.

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..... [4]

(c) Some components of tobacco smoke are absorbed into the blood stream and affect the cardiovascular system.

For Examiner's Use

Describe the effects of nicotine and carbon monoxide on the cardiovascular system.

nicotine .....

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carbon monoxide .....

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..... [4]

[Total: 11]

2 Fig. 2.1 is an electron micrograph of part of an animal cell. A centriole is labelled.

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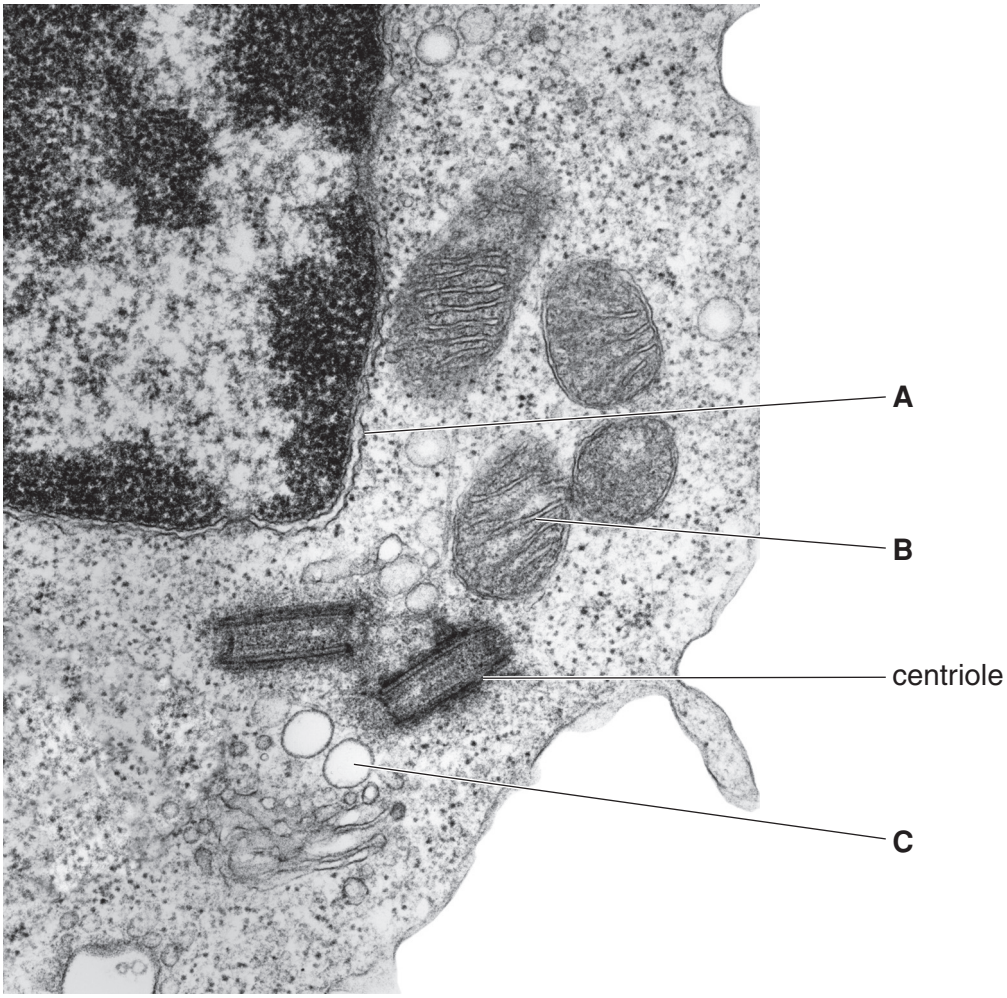


Fig. 2.1

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(a) Name the structures labelled **A** to **C**.

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A .....

B .....

C ..... [3]

(b) Describe the roles of centrioles in animal cells.

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..... [3]

(c) Explain why it is possible to see the internal membranes of a cell in electron micrographs, such as Fig. 2.1, but it is not possible to see them when using the light microscope.

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..... [3]

(d) A student investigated the effect of temperature on beetroot tissue. Beetroot cells contain a dark red pigment known as betalain, which is stored inside their vacuoles.

For Examiner's Use

The student

- cut the beetroot tissue into cubes of the same size
- washed the cubes thoroughly in distilled water
- placed the same number of cubes into distilled water at seven different temperatures.

After 30 minutes, samples of the water were removed and placed in a colorimeter to measure the transmission of light. The lower the percentage transmission the more betalain is present in the water.

The results are shown in Fig. 2.2.

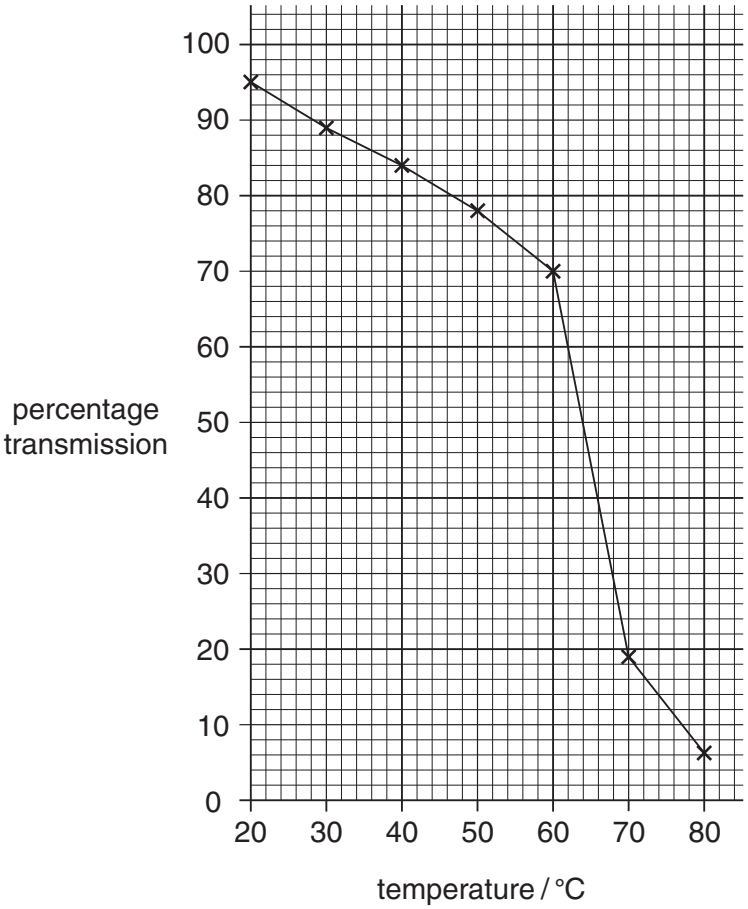


Fig. 2.2

Using the information in Fig. 2.2,

For Examiner's Use

(i) describe the student's results;

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..... [3]

(ii) explain the effect of increasing temperature on the beetroot tissue.

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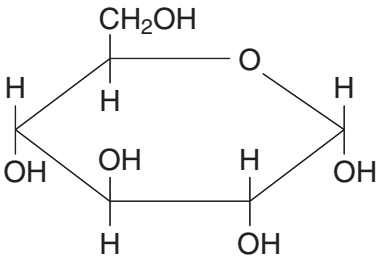
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[Total: 15]

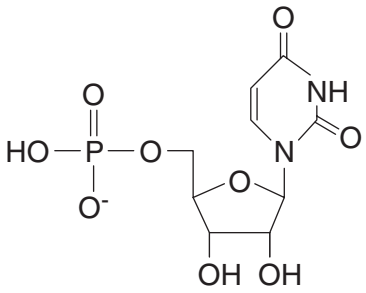
3 Fig. 3.1 shows seven biological molecules, labelled **D** to **K**.

For Examiner's Use

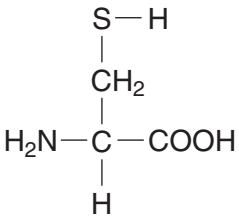
D



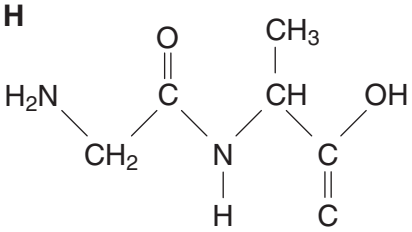
G



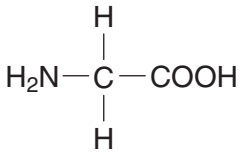
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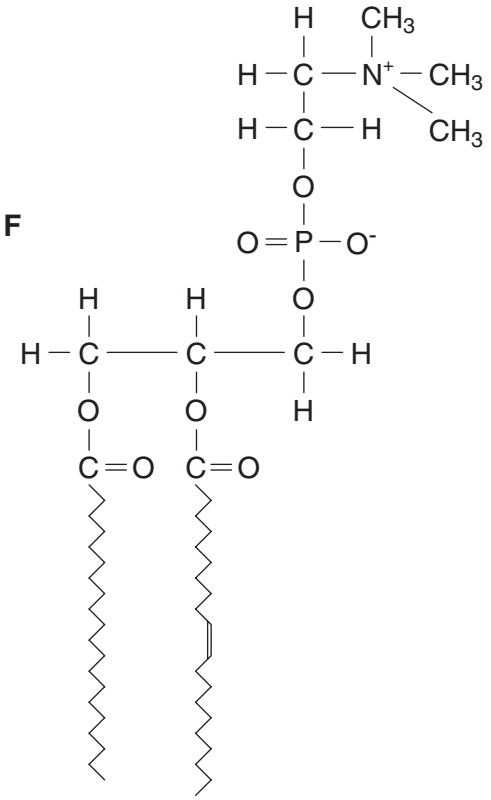
H



J



F



K

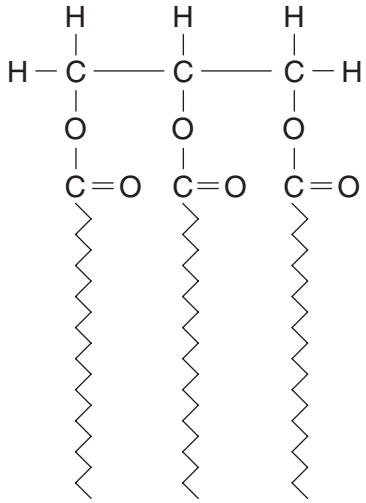


Fig. 3.1

For Examiner's Use

(a) Table 3.1 contains statements about the biological molecules in Fig. 3.1.

Complete the table by selecting the biological molecule from Fig. 3.1 that matches each of the statements. Write the appropriate letter from Fig. 3.1 in the table. The first one has been done for you.

You may use each letter once, more than once or not at all.

Table 3.1

statement	letter
an amino acid that is a major constituent of collagen	**J**
a component of RNA	
a molecule that is polymerised to form glycogen	
a molecule with a peptide bond	
an important store of energy, insoluble in water	
a molecule with hydrophilic and hydrophobic regions	
an amino acid that forms disulfide (disulphide) bonds in proteins	

[6]

(b) Describe two ways in which the **structure** of DNA differs from the **structure** of collagen.

1 .....

.....

2 .....

..... [2]

[Total: 8]

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4 Scientists at the Tibet Institute of Medical Sciences in Lhasa investigated differences between adult Tibetans who had lived in Lhasa (altitude 3658 m) all their lives and adult Han Chinese residents who had lived there for about 8 years. The Tibetans and the Han Chinese exercised at maximum effort and various aspects of their breathing were measured.

Some of the results are shown in Table 4.1.

Table 4.1

feature	Tibetans	Han Chinese
minute volume / $dm^3\ min^{-1}$	149	126
oxygen uptake / $cm^3\ kg^{-1}\ min^{-1}$	51.0	46.0

- Minute volume. This is the volume of air breathed in during one minute.
- Oxygen uptake. This is the volume of oxygen absorbed into the blood during one minute. It is expressed per kg of body mass.

The researchers observed that

- the greater minute volume of the native Tibetans resulted from a greater tidal volume
- the tidal volumes of the Tibetans showed a positive correlation with their vital capacity measurements
- the Han Chinese had lower values for both tidal volume and vital capacity.

(a) State what is meant by the term *tidal volume*.

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..... [1]

(b) Suggest why the researchers also measured the *vital capacity* of the people in the study.

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..... [2]

(c) Explain how the minute volume **at rest** would be determined.

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..... [2]

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(d) Suggest two differences in the **structure** of the lungs that may account for the greater oxygen uptake by the Tibetans shown in Table 4.1.

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1 .....

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2 .....

..... [2]

(e) When people who have lived all their lives at low altitude go to a place at high altitude, such as Lhasa, they are often breathless, lack energy and suffer from altitude sickness. However, with time, they often acclimatise to the high altitude.

In another study, researchers found that the red blood cell count increases in such people by about 30% over several weeks.

Explain why the red blood cell count increases so much when people visit places at high altitude.

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..... [2]

[Total: 9]

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[Turn over

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5 An estimated 300 to 500 million cases of malaria occur worldwide each year resulting in 1 to 3 million deaths. 80% of these cases are in children under the age of five.

There are four species of malarial parasite, of which *Plasmodium falciparum* is responsible for most of the deaths from this disease.

(a) Describe how the malarial parasite is transmitted.

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..... [3]

(b) Several potential vaccines against malaria have been developed. Some of these make use of proteins from the surface membrane of *P. falciparum*.

(i) Explain how using such a vaccine may give long-term immunity to malaria.

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..... [4]

(ii) Researchers have been trying to develop a successful vaccine against malaria for about 20 years. Explain why it has proved so difficult to develop such a vaccine.

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..... [2]

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(c) Proteins on the surface of the parasite are responsible for binding to surface receptors on the red blood cells. These are removed when the parasites enter the red blood cells.

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An enzyme has recently been discovered in *P. falciparum* that is responsible for the removal of these proteins. If the enzyme does not function then the parasites cannot enter red blood cells.

It has been suggested that a drug could be developed to inhibit this enzyme.

Describe **one** possible way in which such a drug might act on the enzyme to prevent it from functioning.

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..... [3]

[Total: 12]

6 Fig. 6.1 shows some feeding relationships in an Arctic ecosystem.

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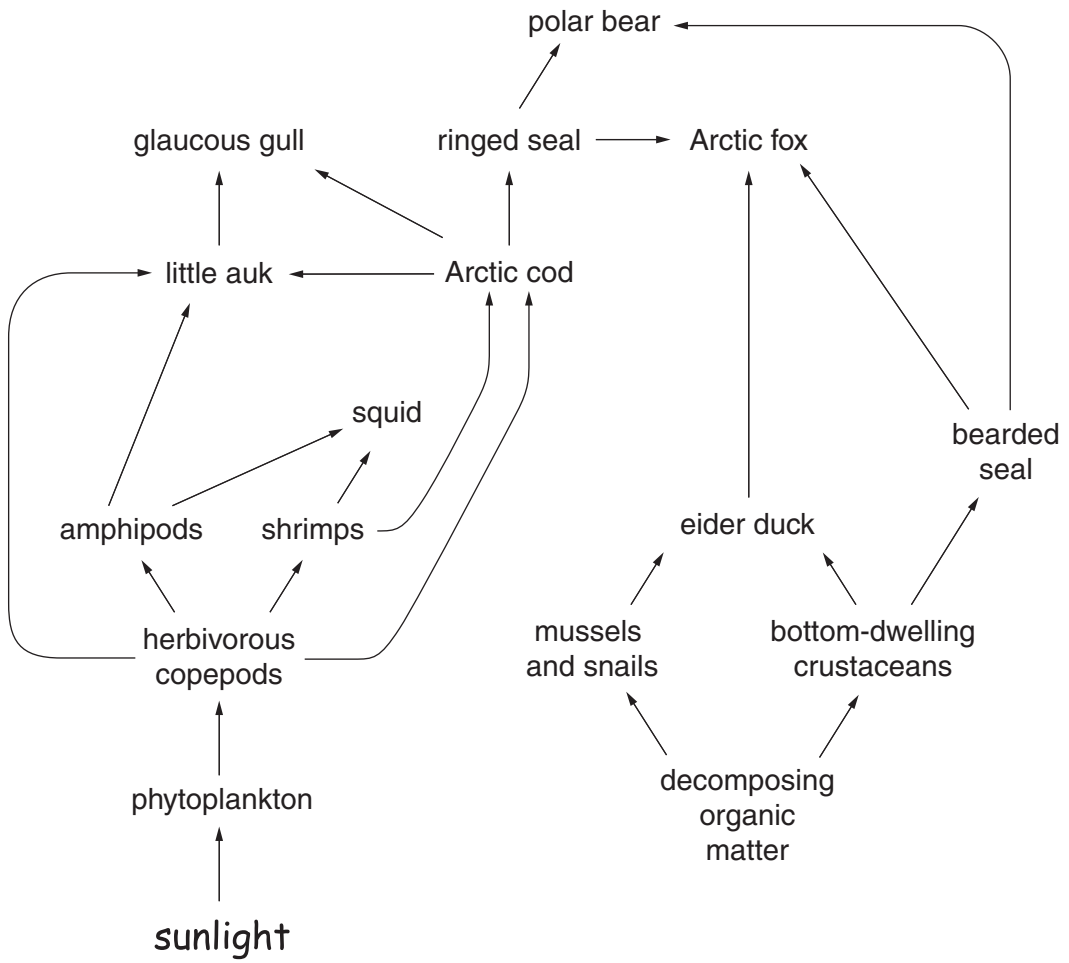


Fig. 6.1

(a) Using the information shown in Fig. 6.1,

(i) name **two** organisms that are feeding as secondary consumers;

.....

..... [1]

(ii) explain why it is difficult to assign some organisms to trophic levels.

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..... [2]

(b) The efficiency of energy transfer through a trophic level is calculated by comparing the energy available to that trophic level with the energy available to the next trophic level.

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It has been estimated that the efficiency of energy transfer by herbivorous copepods is about 17%.

State two factors that are likely to influence the efficiency of energy transfer by herbivorous copepods.

1 .....

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2 .....

..... [2]

[Total: 5]

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Question 2 Fig. 2.1 © Dr. Don W. Fawcett / Visuals Unlimited.

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