| Centre Number | Candidate Number | Name |
|---|---|---|
| | | |

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

**BIOLOGY** **9700/02**

Paper 2 Structured Questions AS

May/June 2005

**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 pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams, graphs, or rough working.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
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 **14** printed pages and **2** blank pages.


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Answer **all** the questions.

**1** Fig. 1.1 shows the replication of one strand of a DNA double helix.

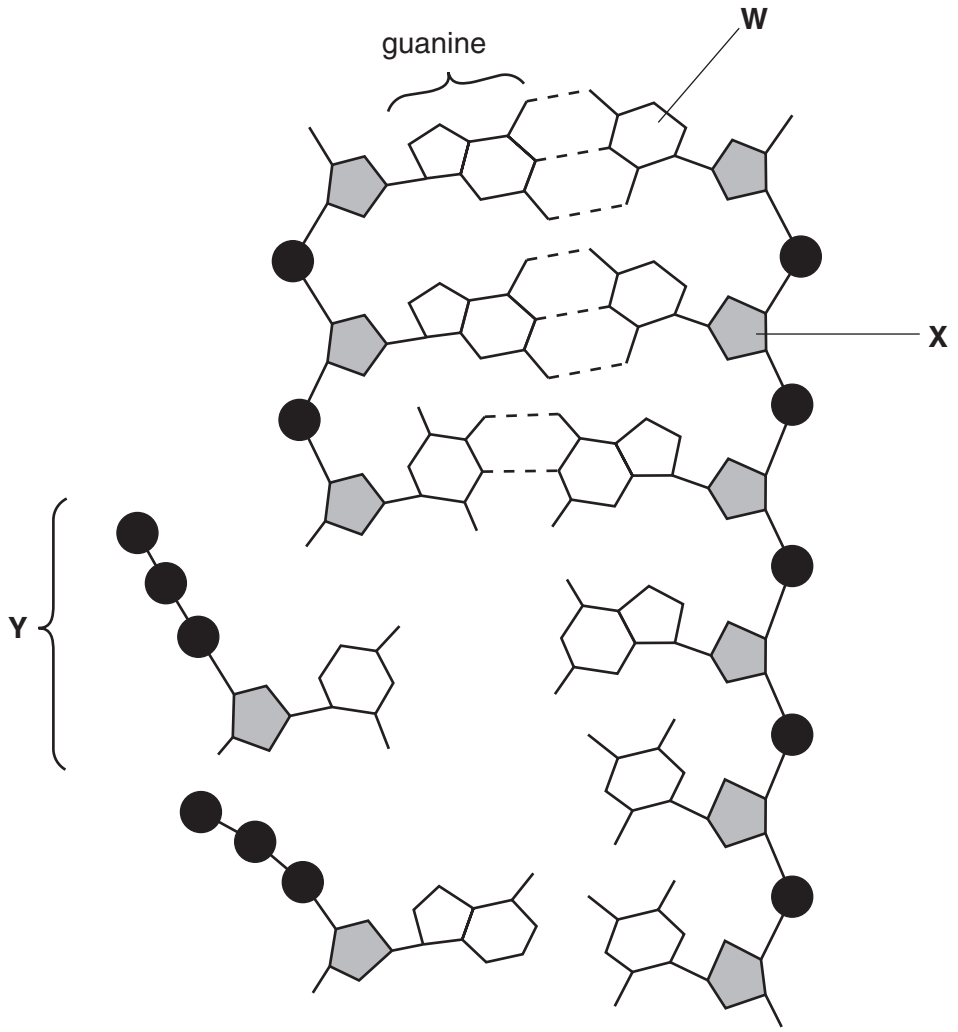



**Fig. 1.1**

**(a)** Name **W** to **Y**.

**W** .....

**X** .....

**Y** ..... [3]

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**(b)** Explain how the structure of DNA enables it to replicate semi-conservatively.

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.....

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.....

..... [3]

**(c)** Explain why it is important that an exact copy of DNA is made during replication.

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..... [2]

[Total: 8]

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**2** Fig. 2.1 is a drawing of a transverse section of a leaf.

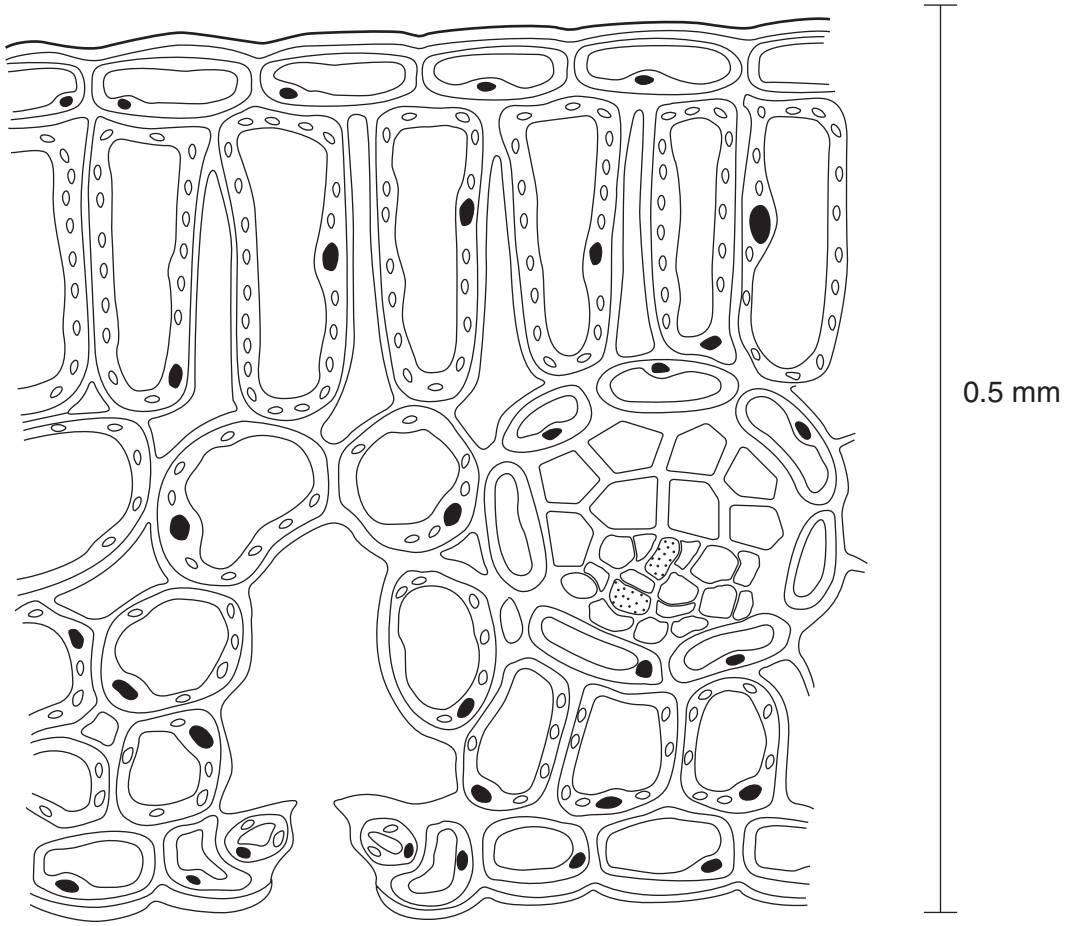



**Fig. 2.1**

**(a) (i)** Use label lines and the letters **X**, **S**, **E** and **D** to indicate the following on Fig. 2.1:

**X** – a xylem vessel
**S** – a phloem sieve tube
**E** – a lower epidermal cell
**D** – a palisade mesophyll cell [4]

**(ii)** Calculate the magnification of Fig. 2.1. Show your working and express your answer to the nearest whole number.

Answer ..... [2]

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**(b)** Name **two** assimilates that move from the palisade mesophyll cells to the vascular tissue to be exported from the leaf.

1 .....

2 ..... [2]

**(c)** Explain, using the term **water potential**, how water moves from the vascular tissue to the atmosphere.

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..... [4]

[Total: 12]

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**3** **(a)** As blood passes through the capillaries in the lungs it becomes oxygenated.

Explain how the structure of haemoglobin aids the uptake of oxygen in the lungs.

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..... [4]

Fig. 3.1 shows the dissociation curve of adult haemoglobin.

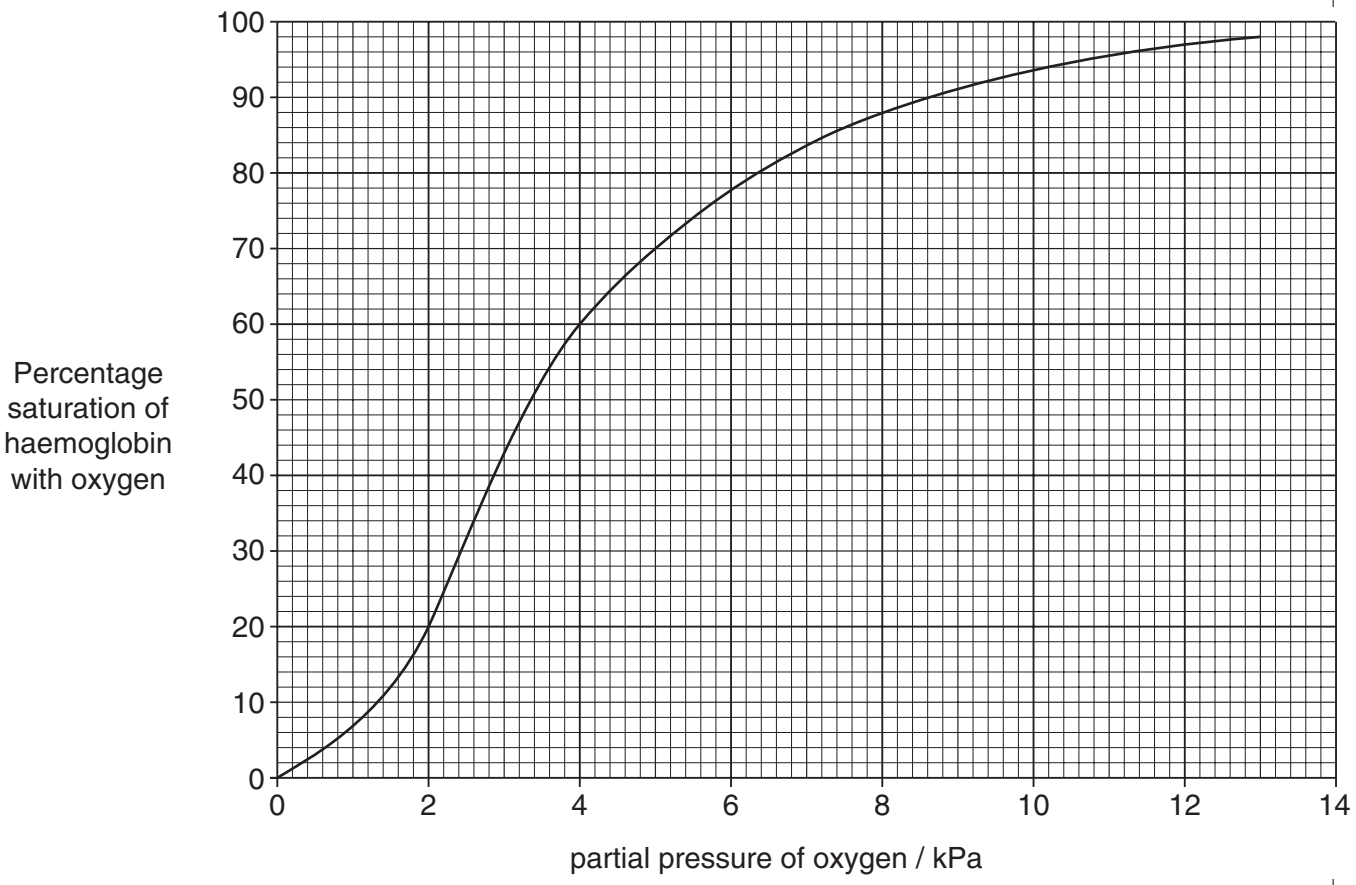



**Fig. 3.1**

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**(b)** Use the information given in Fig. 3.1 to complete the table below.

| part of the circulation | partial pressure of oxygen / kPa | percentage saturation of haemoglobin |
|---|---|---|
| capillaries in the lungs | | 98 |
| capillaries in muscle tissue at rest | | 70 |
| capillaries in muscle tissue during strenuous exercise | 2.0 | |

[3]

**(c)** During exercise the concentration of carbon dioxide in muscle tissue increases. This stimulates an increase in the release of oxygen from the blood.

Explain how carbon dioxide stimulates the release of oxygen from the blood.

.....

.....

.....

.....

.....

..... [3]

[Total: 10]

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**4** Collagen is found in the extracellular matrix of muscles, tendons, ligaments and bones. Fibroblast cells in these tissues make collagen by synthesising polypeptides that form molecules with a triple helix shape. These are secreted from fibroblasts into the extracellular matrix where enzymes assemble them into collagen fibres.

Fig. 4.1 is a diagram summarising these events.

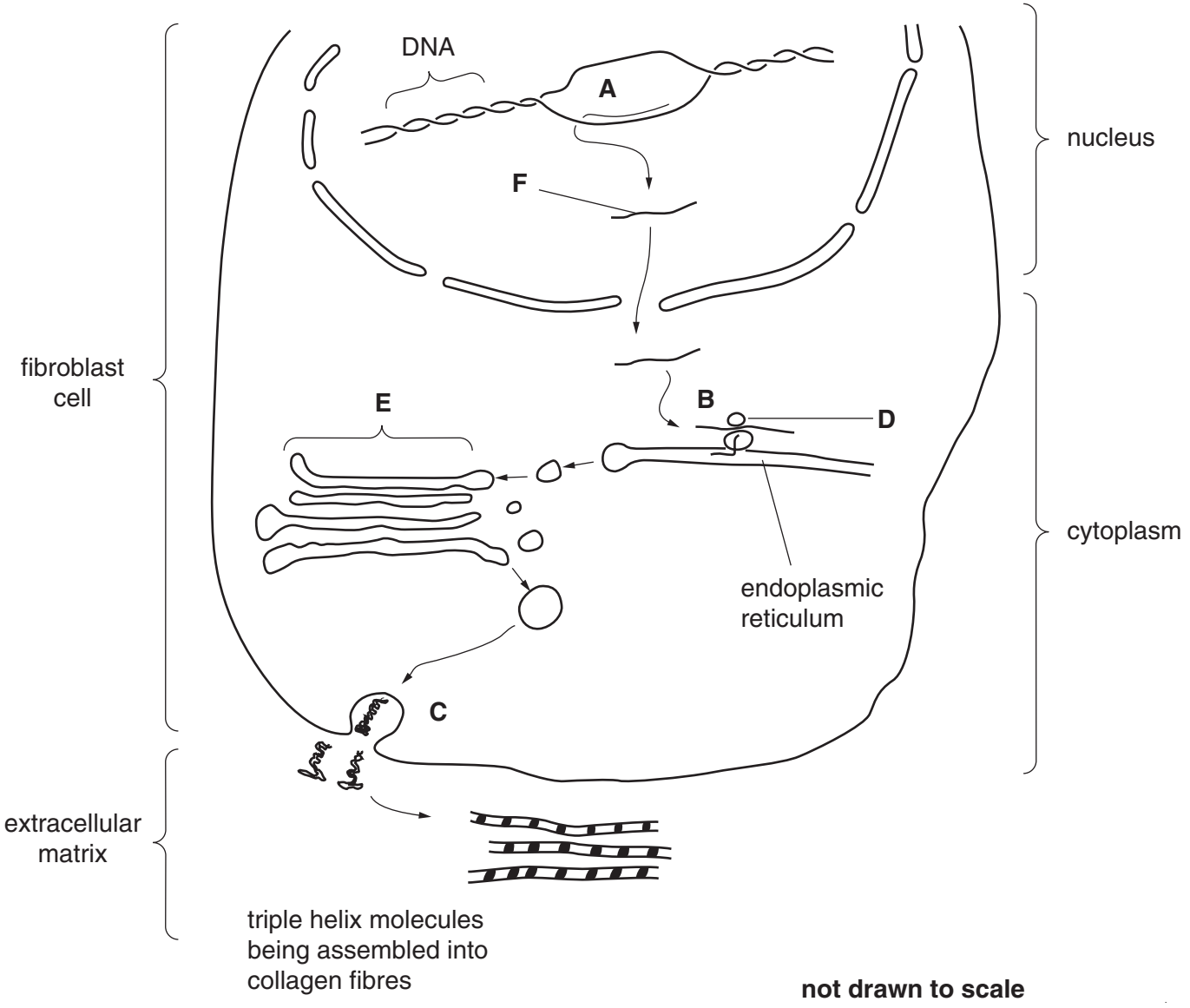



**Fig. 4.1**

**(a) (i)** Name the processes occurring at **A**, **B** and **C**.

**A** .....

**B** .....

**C** ..... [3]

**(ii)** Name structures **D** and **E**.

**D** .....

**E** ..... [2]

**(iii)** Name molecule **F**.

**F** ..... [1]

Collagen is continuously broken down in the extracellular matrix by the enzyme collagenase, which catalyses the hydrolysis of the peptide bond between the amino acids glycine and isoleucine.

**(b)** Suggest how collagenase is only able to act on the peptide bond between glycine and isoleucine and not on peptide bonds between any other amino acids.

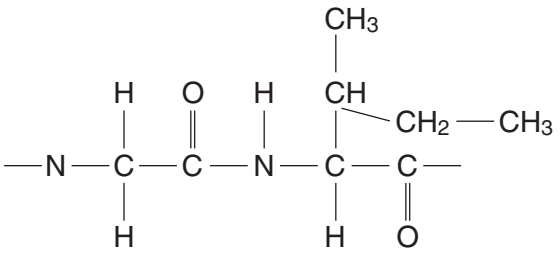
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..... [2]

**(c)** Draw a diagram below to show how the peptide bond between glycine and isoleucine is broken by hydrolysis including the product or products.




[3]

[Total: 11]

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**5** The eelgrass, *Zostera*, is a marine plant that forms dense vegetation in shallow coastal waters. The primary consumers in this ecosystem eat the eelgrass and the photosynthetic algae that grow on its surface.

Fig. 5.1 shows the flow of energy through an eelgrass ecosystem. The figures in circles represent the energy transfer in $kJ\,m^{-2}\,yr^{-1}$.

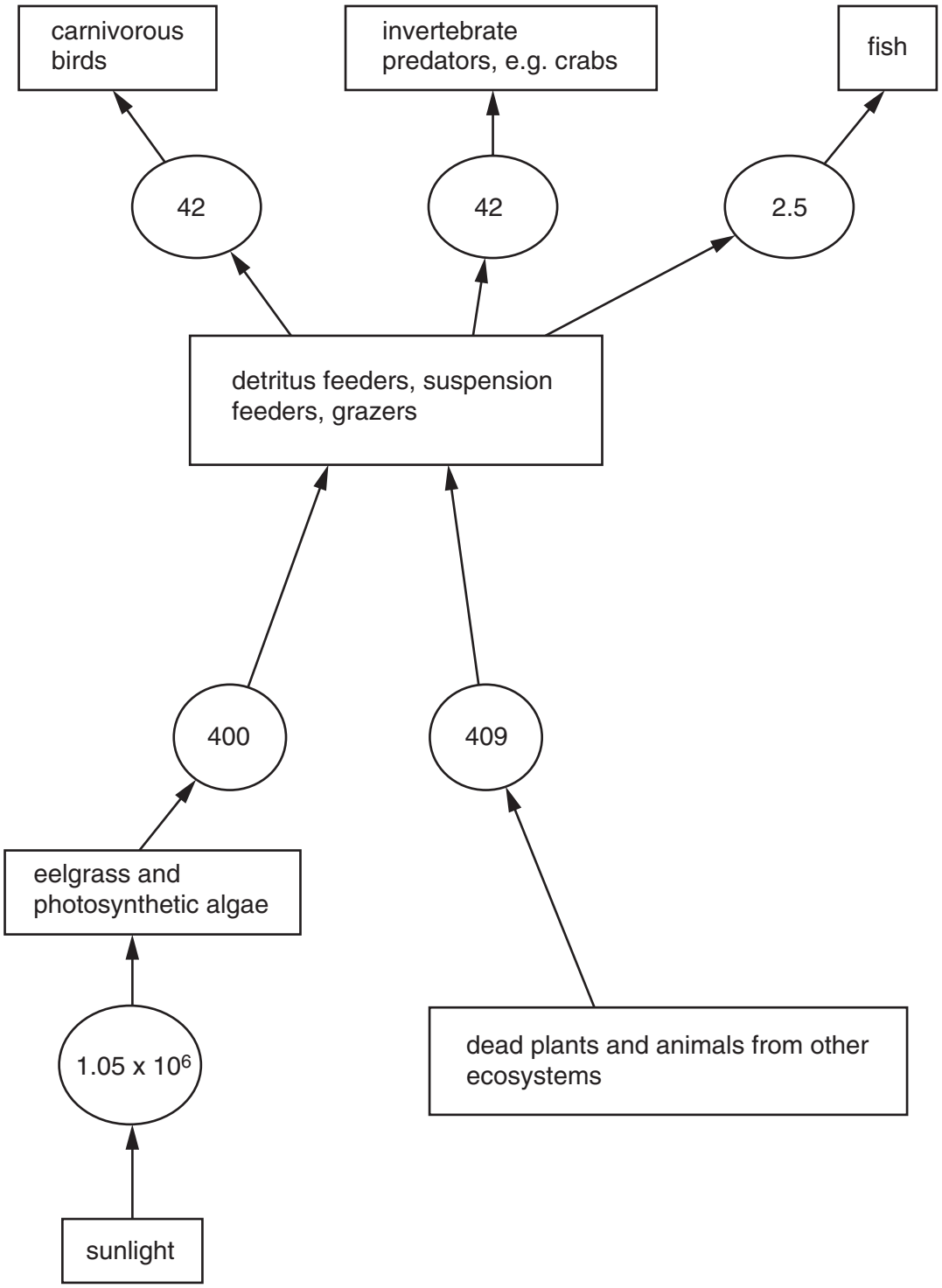



**Fig. 5.1**

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**(a)** Calculate the percentage of energy transferred from primary consumers to the secondary consumers in the ecosystem shown in Fig. 5.1. Show your working and express your answer to the nearest whole number.

Answer …… [2]

**(b)** Explain why little of the energy present in producers is transferred to the secondary consumers.

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..... [4]

**(c)** Dead plants contain nitrogen in the form of proteins. These are decomposed by bacteria.

Outline how bacteria convert nitrogen in these proteins to a form that may be taken up by living plants.

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..... [2]

[Total: 8]

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**6** **(a)** Substances are exchanged between the plasma, tissue fluid, lymph and red blood cells.

Complete the table below to show which of the statements apply to each of these components of the body.

Fill in each box using a tick (✓) to show that the statement applies or a cross (✗) if it does not. The first row has been completed for you.

| statement | plasma | tissue fluid | lymph | cytoplasm of red blood cells |
|---|---|---|---|---|
| formed by leakage from capillaries | ✗ | ✔ | ✗ | ✗ |
| contains haemoglobin | | | | |
| contains water | | | | |
| contains antibodies | | | | |
| in direct contact with muscle cells | | | | |

[4]

**(b)** Nicotine is the drug in tobacco smoke.

State **two** effects of nicotine on the cardiovascular system.

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.....

..... [2]

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Table 6.1 shows information on smoking and lung cancer in six countries.

Table 6.1 shows:

- the percentage of male and female adults who smoke regularly in each country;
- the death rates from lung cancer expressed as deaths per 100 000 of the population of each country.

**Table 6.1**

| country | percentage of the population who smoke | | deaths from lung cancer / deaths per 100 000 | |
|---|---|---|---|---|
| | males | females | males | females |
| China | 53.4 | 4.0 | 22.7 | 10.5 |
| France | 33.0 | 21.0 | 73.3 | 14.4 |
| Malaysia | 49.2 | 3.5 | 5.6 | 2.3 |
| New Zealand | 25.1 | 24.8 | 47.3 | 29.2 |
| South Africa | 43.8 | 11.7 | 13.8 | 5.4 |
| Trinidad and Tobago | 42.1 | 8.0 | 12.3 | 4.2 |

**(c)** Explain whether or not there is any evidence in Table 6.1 to support the following statements.
Use the data in the table to support your answer.

Men are more at risk of dying from lung cancer than women.

.....

.....

.....

Countries where a high percentage of the population smoke have high death rates from lung cancer.

.....

.....

..... [3]

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**(d)** Table 6.1 shows that a larger percentage of men in some countries, such as Malaysia, smoke compared with New Zealand. It also shows that the death rate from lung cancer for men in Malaysia is much lower.

Suggest **two other** pieces of information about men who smoke that would be useful in evaluating the risks of developing lung cancer.

1 .....

.....

2 .....

..... [2]

[Total: 11]

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