Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER			

BIOLOGY **0610/32**

Paper 3 Extended **October/November 2014**

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 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.

The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

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CAMBRIDGE International Examinations

1 Fig. 1.1 is a photomicrograph of a leaf of the tea plant, *Camellia sinensis*.

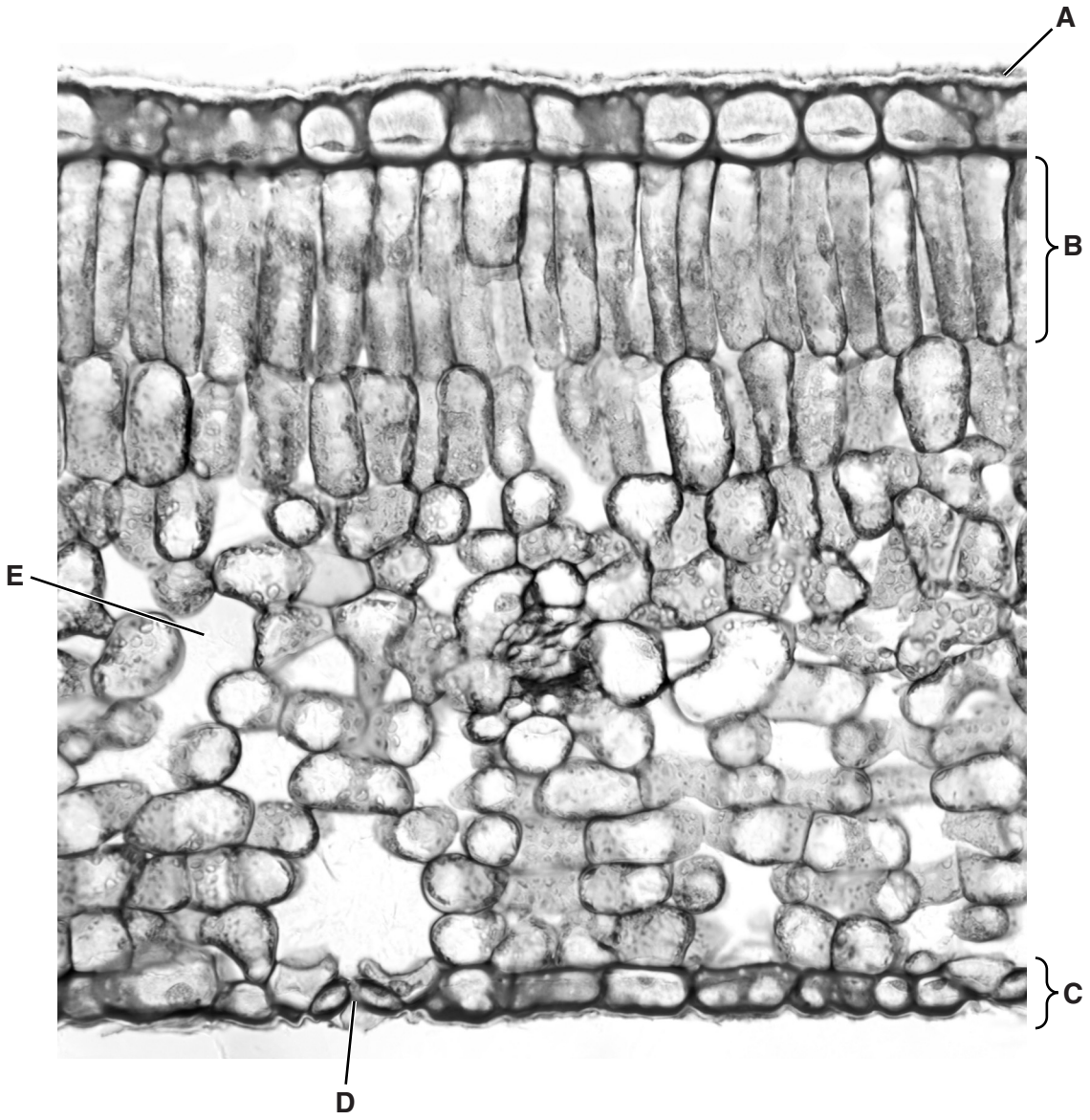

Fig. 1.1

(a) Name **A** to **E**.

View solution

A .....

B .....

C .....

D .....

E .....[5]

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(b) Fig. 1.2 shows a cell from region **B** of the leaf shown in Fig. 1.1.

View solution

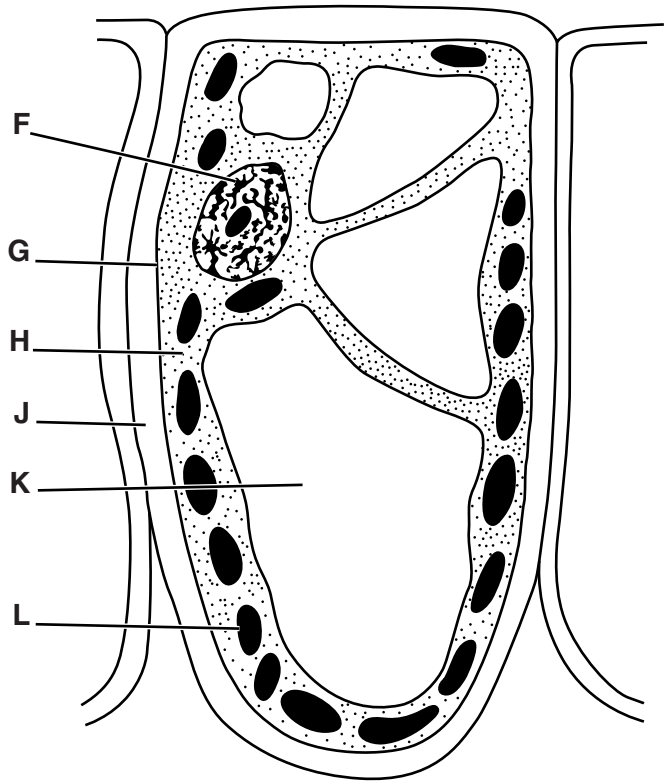

Fig. 1.2

Use the letters from Fig. 1.2 to complete Table 1.1.

Write **one** letter only in each box to identify the function. You may use each letter once, more than once or not at all.

Table 1.1

function	letter from Fig. 1.2
controls movement of substances into and out of the cell	
exerts a pressure to help maintain the shape of the cell	
produces sugars using light as a source of energy	
withstands the internal pressure of the cell	
controls all the activities of the cell	

[5]

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(c) The enzyme catalase is found in lettuce leaves.

A student investigated the activity of this enzyme by grinding some lettuce leaves and adding them to a solution of hydrogen peroxide. The volume of oxygen produced was measured until the reaction stopped.

View solution

The student's results are shown in Fig. 1.3.

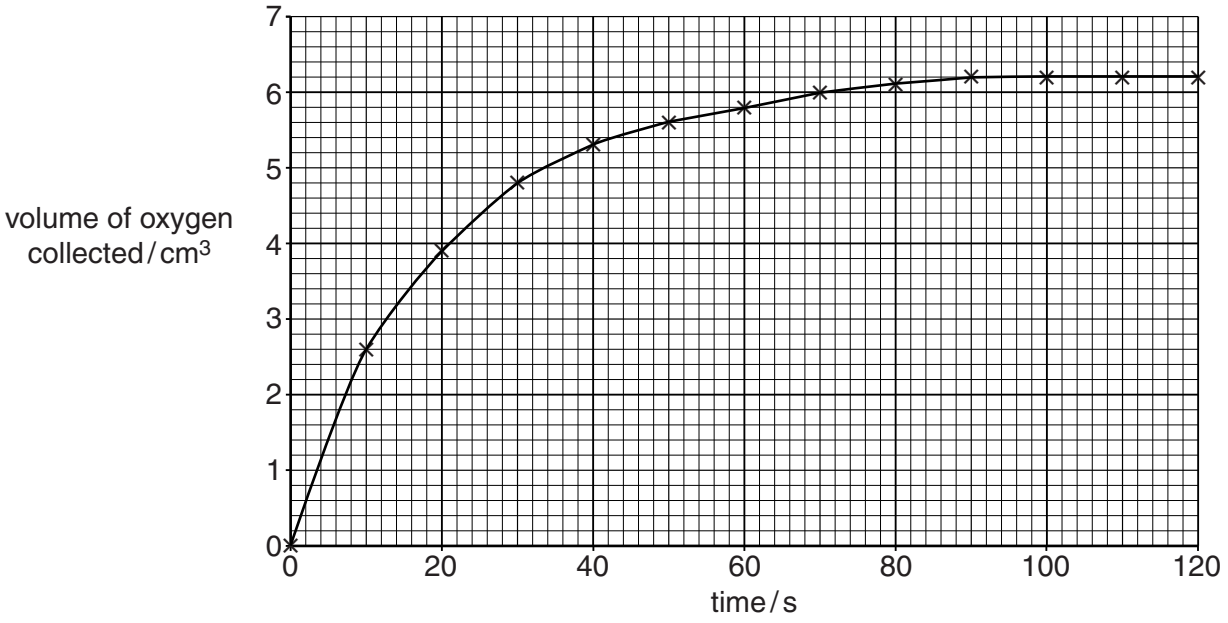

Fig. 1.3

(i) Describe the results shown in Fig. 1.3. You will gain credit if you use the data in your answer.

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.....[3]

(ii) Explain the action of enzymes during a reaction.

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.....[3]

[Total: 16]

View solution

2 **(a)** Define the term *excretion*.

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View solution

Fig. 2.1 is a diagram of a kidney tubule and its blood supply.

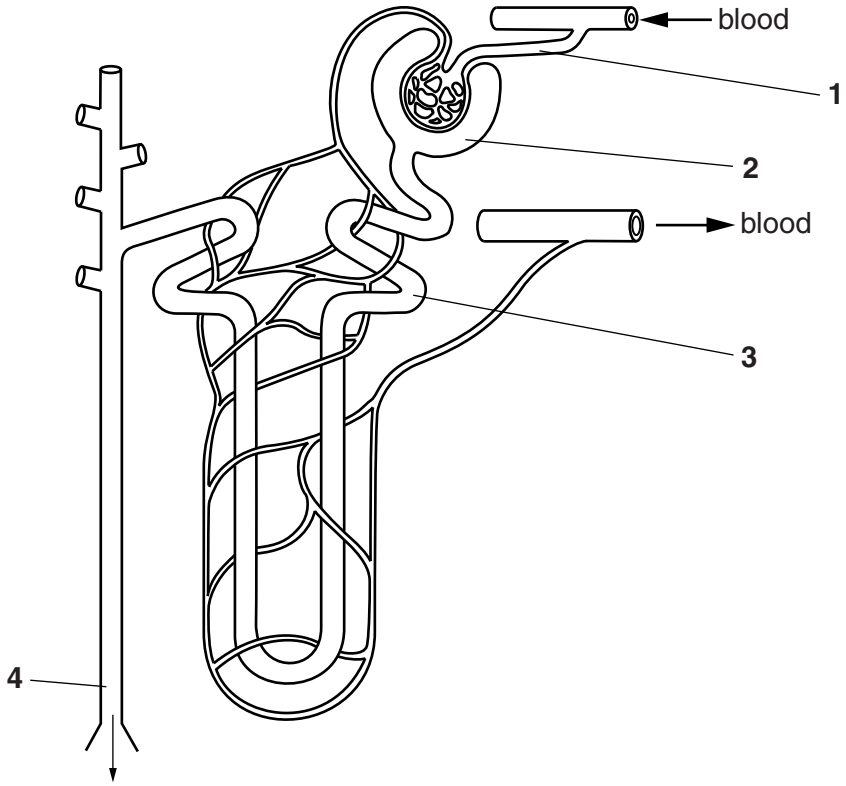

Fig. 2.1

(b) The concentrations of solutes in the fluids at regions **1**, **2**, **3** and **4** were determined. The results are shown in Table 2.1.

View solution

Table 2.1

substance	concentration / g dm^{-3}			
	region **1**	region **2**	region **3**	region **4**
glucose	0.9	0.9	0.2	0.0
protein	82.0	0.0	0.0	0.0
salts	8.0	8.0	9.6	16.5
urea	0.2	0.2	0.2	20.0

State the substance or substances in Table 2.1 which:

(i) has molecules which are too large to be filtered;

.....[1]

(ii) has molecules which are small enough to be filtered but is completely reabsorbed from the fluid in the kidney tubule;

.....[1]

(iii) increases in concentration as fluid moves along the kidney tubule.

1 .....

2 .....[1]

(c) State **three** structures through which the fluid from region **4** passes as it leaves the body.

View solution

1 .....

2 .....

3 .....[3]

(d) One role of the kidney is to maintain the concentration of the blood plasma.

View solution

Name the process of maintaining constant conditions within the body.

.....[1]

[Total: 10]

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3 Sewage treatment works use bacteria to digest the waste matter. Waste matter contains complex organic compounds, such as starch, cellulose, protein and fat.

Fig. 3.1 shows a diagram of a sewage works with an aerobic digestion tank.

The sewage works discharges clean water into a river. Downstream from the sewage works, water is removed to be used as drinking water for a nearby village.

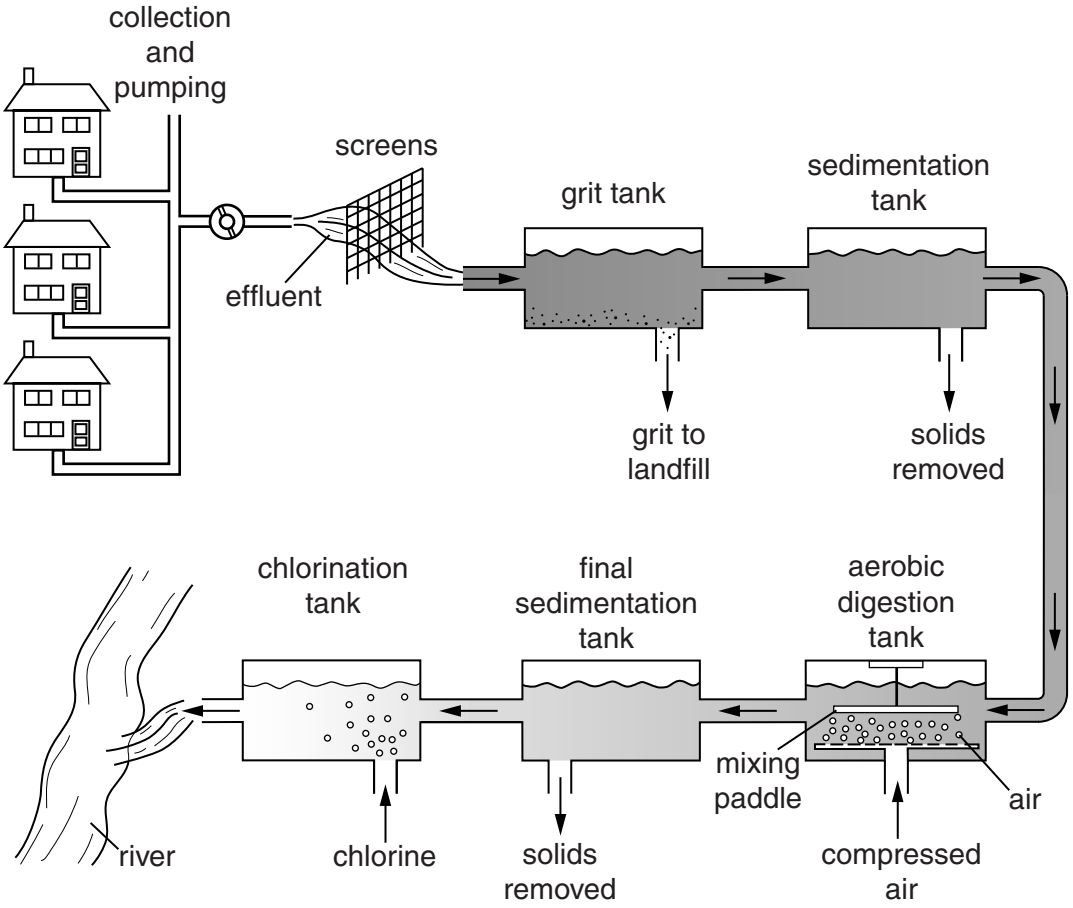

Fig. 3.1

(a) Explain the roles of bacteria in the aerobic digestion tank shown in Fig. 3.1.

View solution

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.....[5]

(b) Fig. 3.1 shows that chlorine is added to water before it leaves the sewage treatment works.

Explain why chlorine is added to the water.

View solution

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.....[2]

[Total: 7]

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4 Mammals have a double circulatory system. Blood flows between:

- the heart and the lungs
- the heart and the rest of the body (systemic circulation).

View solution

(a) Fig. 4.1 shows a cross-section of an artery.

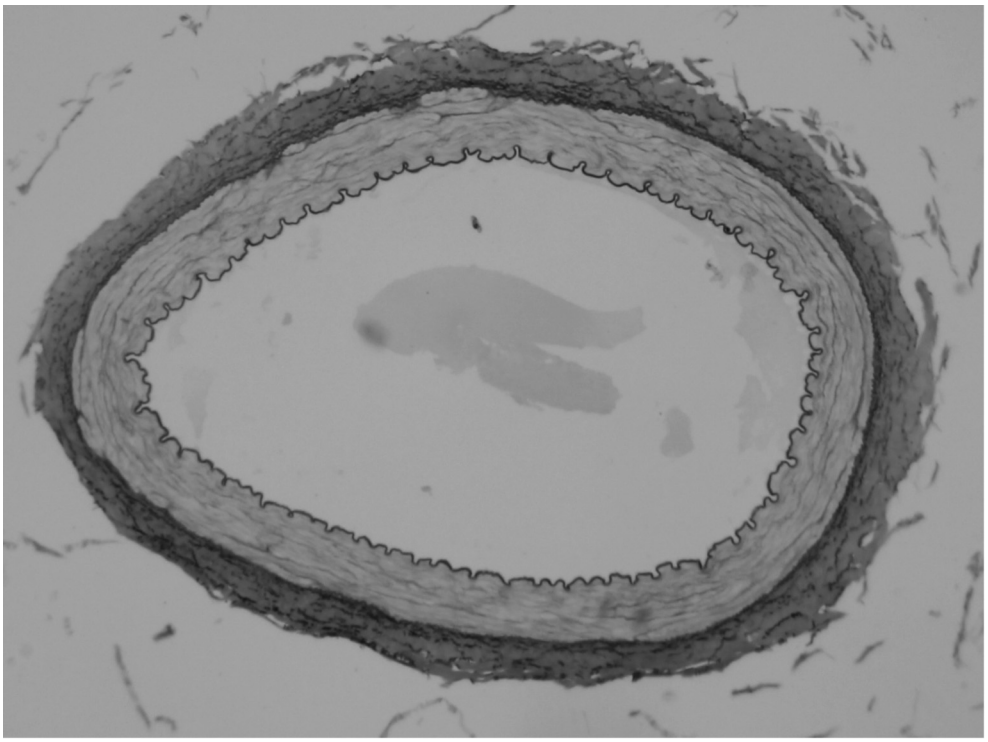

Fig. 4.1

Explain how the structure of an artery, as shown in Fig. 4.1, is related to its functions.

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.....[4]

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Question 4 continues on page 12.

(b) Fig. 4.2 shows the total cross-sectional area of the blood vessels in the systemic circulation. It also shows the changes that occur in blood pressure and the speed (velocity) of blood in the different blood vessels.

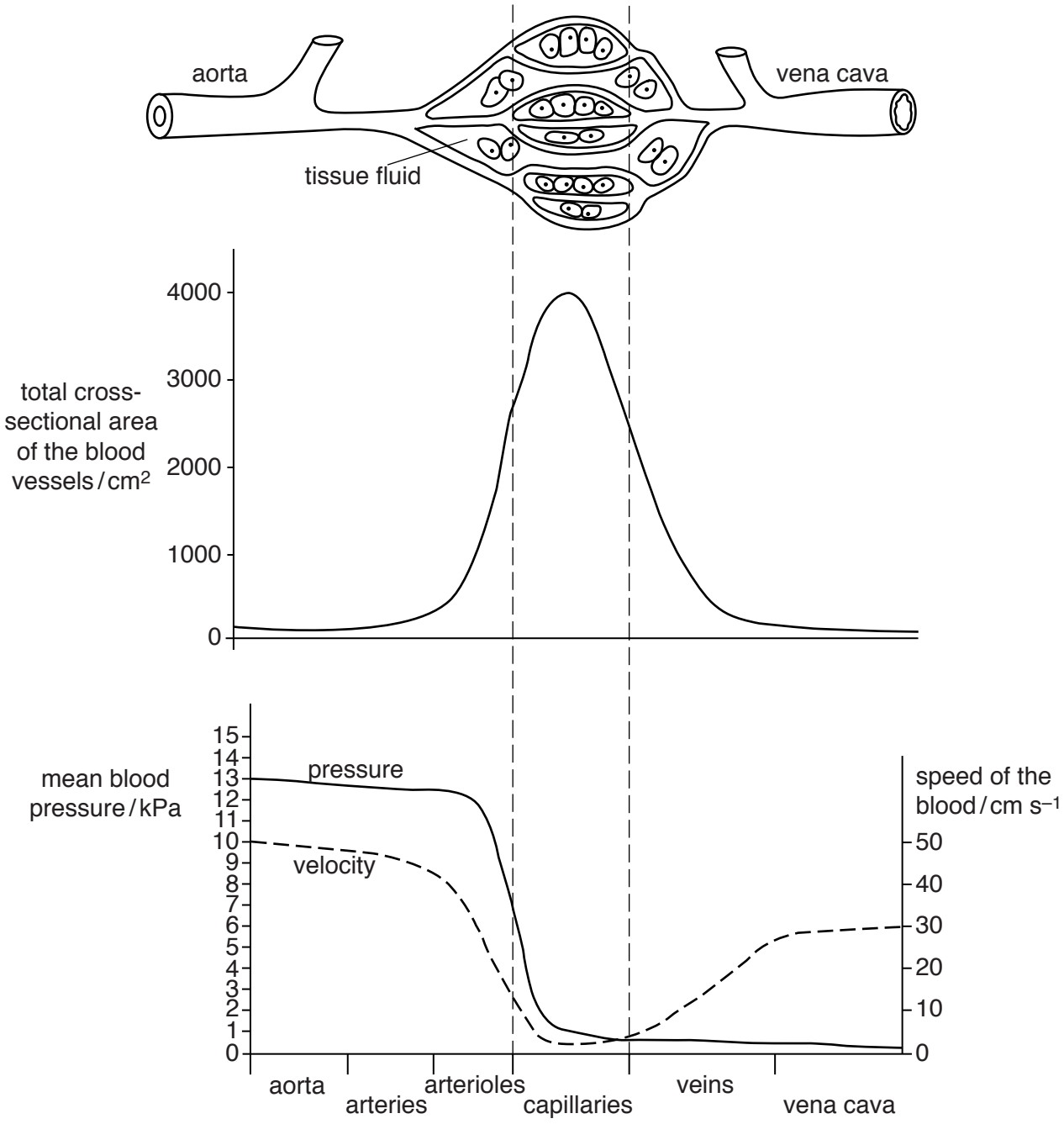

Fig. 4.2

(i) State the maximum mean blood pressure in the aorta.

View solution

.....[1]

(ii) Describe how mean blood pressure and speed of blood change with cross-sectional area of blood vessels, as shown in Fig. 4.2.

blood pressure .....

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speed of blood .....

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.....[3]

(c) Describe how substances move from the blood in the capillaries into the tissue fluid.

View solution

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.....[3]

(d) Blood flows from arteries into arterioles before entering capillaries.

View solution

Explain the role of the arterioles in the skin when a person is very cold.

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.....[3]

[Total: 14]

5 Fig. 5.1 is a diagram of the human immunodeficiency virus (HIV).

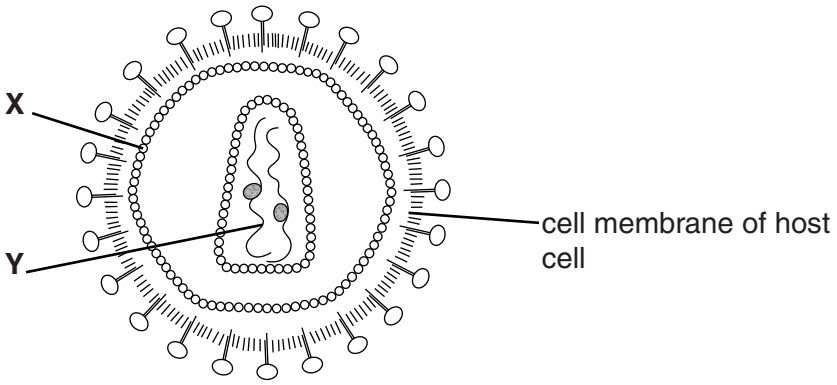

Fig. 5.1

(a) (i) Name the parts of the virus labelled **X** and **Y**.

View solution

X .....

Y .....[2]

(ii) State three ways in which the **structure** of bacteria differs from the structure of viruses.

1 .....

2 .....

3 .....[3]

View solution

Question 5 continues on page 16.

(b) Sub-Saharan Africa has the highest proportion of the population living with HIV in the world. The World Health Organization estimates both the total number of people who live with HIV and the total number of people that are newly infected each year.

Fig. 5.2 shows the estimated numbers for sub-Saharan Africa between 1990 and 2010.

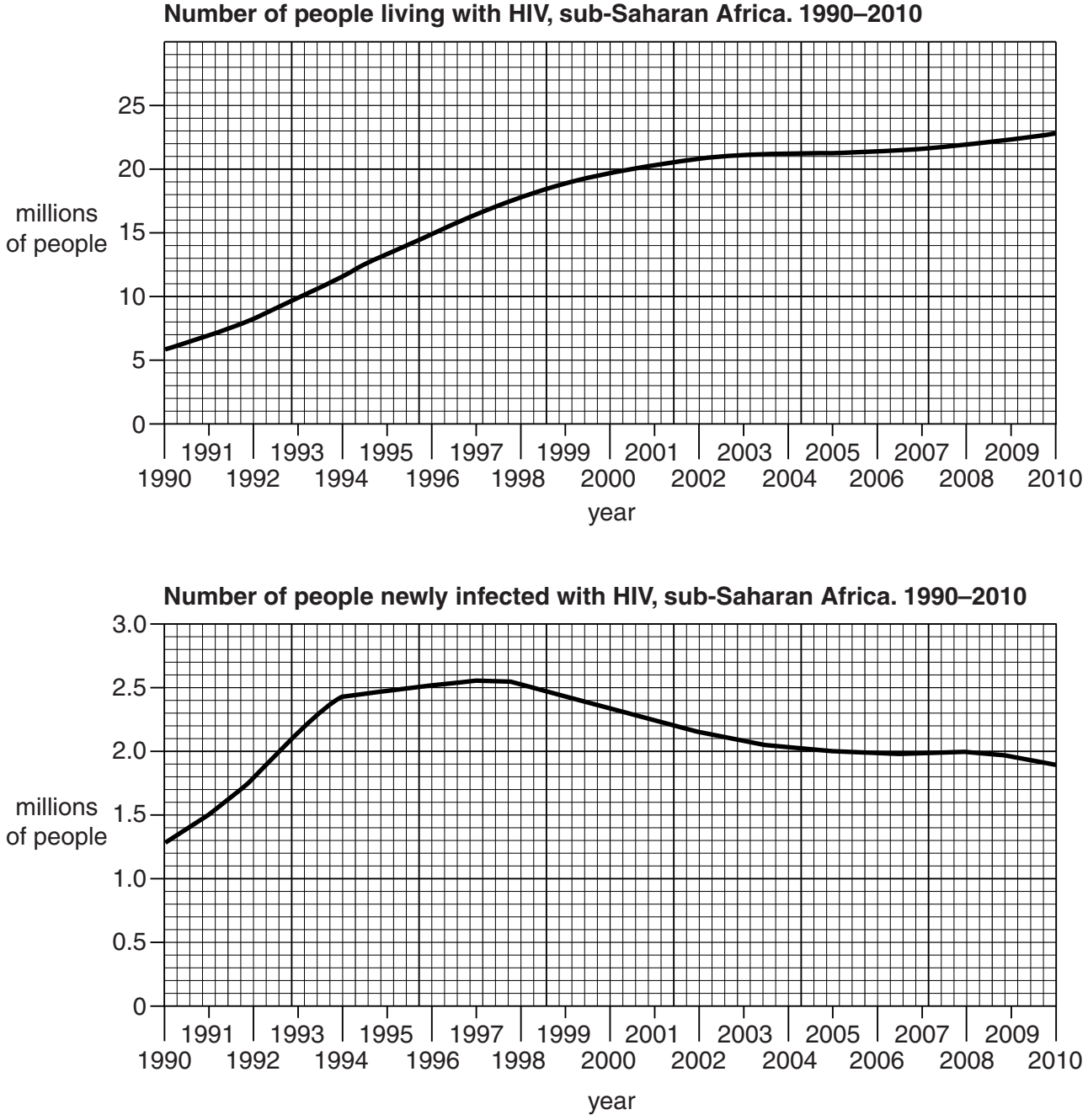

Fig. 5.2

(i) Summarise the changes between 1990 and 2009 in the number of people living with HIV and the number of people newly infected with HIV.

number of people living with HIV.....

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number of people newly infected with HIV .....

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.....[4]

(ii) Suggest why in 2010 the number of people living with HIV increased but the number of newly infected people decreased.

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.....[2]

(iii) Describe **three** ways in which HIV is transmitted from infected to uninfected people.

View solution

1 .....

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2 .....

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3 .....

.....[3]

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(iv) Describe the effects of HIV on the immune system.

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[Total: 17]

Question 6 begins on page 20.

6 Some pollutants are not broken down easily and remain in the environment for a long time. These are described as persistent pollutants.

PCBs are a waste material from the manufacturing of electrical insulation. PCBs are one of the most persistent pollutants in the environment.

Between 1947 and 1976, factories dumped large quantities of PCBs into the Hudson River in the USA. Studies measured the concentrations of PCBs in the tissues of organisms in a food chain in the sea near the Hudson River, as shown in Fig. 6.1.

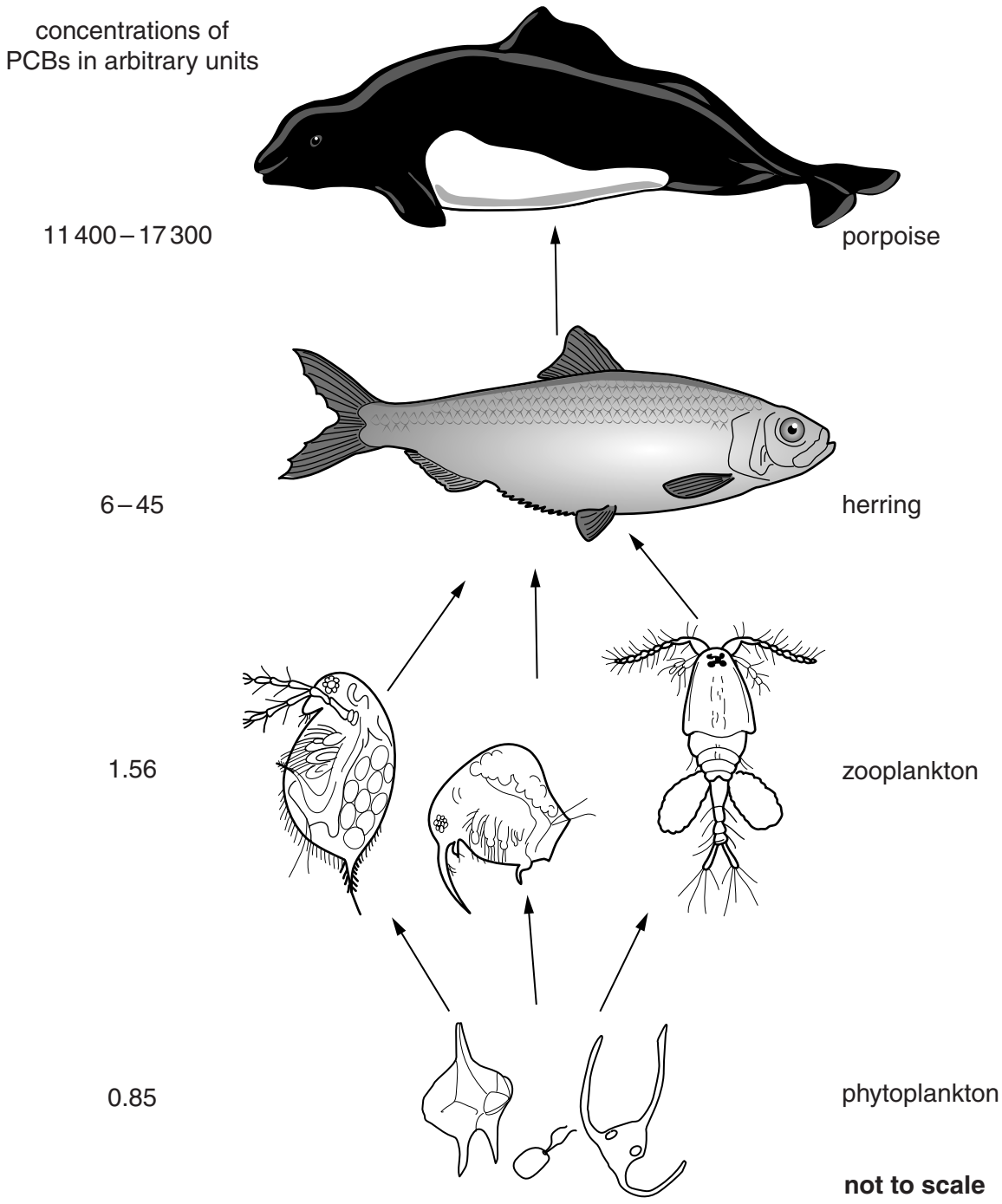

Fig. 6.1

(a) (i) Describe the results shown in Fig. 6.1.

View solution

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(ii) Suggest an explanation for the different concentrations of PCBs in the organisms of the food chain.

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View solution

(b) PCBs are toxic to many organisms because they bind to a protein molecule known as AHR.

The Atlantic tomcod, *Microgadus tomcod*, is a fish that lives in the Hudson River and other rivers nearby.

90% of the tomcod population in the Hudson River is resistant to the effects of PCBs. This is because these fish have a different type of AHR compared with other tomcod populations.

View solution

(i) Suggest how this resistance came about.

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.....[5]

(ii) Scientists predict that the proportion of fish resistant to PCBs will decrease if the concentration of PCBs in the river decreases.

Suggest reasons why the proportion of fish with the altered AHR protein might decrease.

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.....[2]

View solution

(c) Describe the problems caused by non-biodegradable plastics in the environment.

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[Total: 16]

View solution

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Figure 1.1 © Ref: C003/5023; *Tea leaf, light micrograph*; www.sciencephoto.com.
Figure 5.2 © *GLOBAL HIV/AIDS RESPONSE – Epidemic update and health sector progress towards Universal Access – Progress Report;* 2011; http://whqlibdoc.who.int/publications/2011/9789241502986_eng.pdf.

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