Cambridge IGCSE

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME	
CENTRE NUMBER	
CANDIDATE NUMBER	

2480390357

BIOLOGY **0610/43**

Paper 4 Theory (Extended) **October/November 2018**

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.

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

This document consists of **17** printed pages and **3** blank pages.

1 Water is a very important molecule for all living organisms.

(a) (i) State the name of the organ in plants where most water is absorbed.

.....[1]

(ii) State the name of the organ in humans where most water is absorbed.

.....[1]

(iii) State **one** property of water that makes it useful to animals and plants.

.....[1]

(b) The flow diagram in Fig. 1.1 shows a town and part of the water cycle.

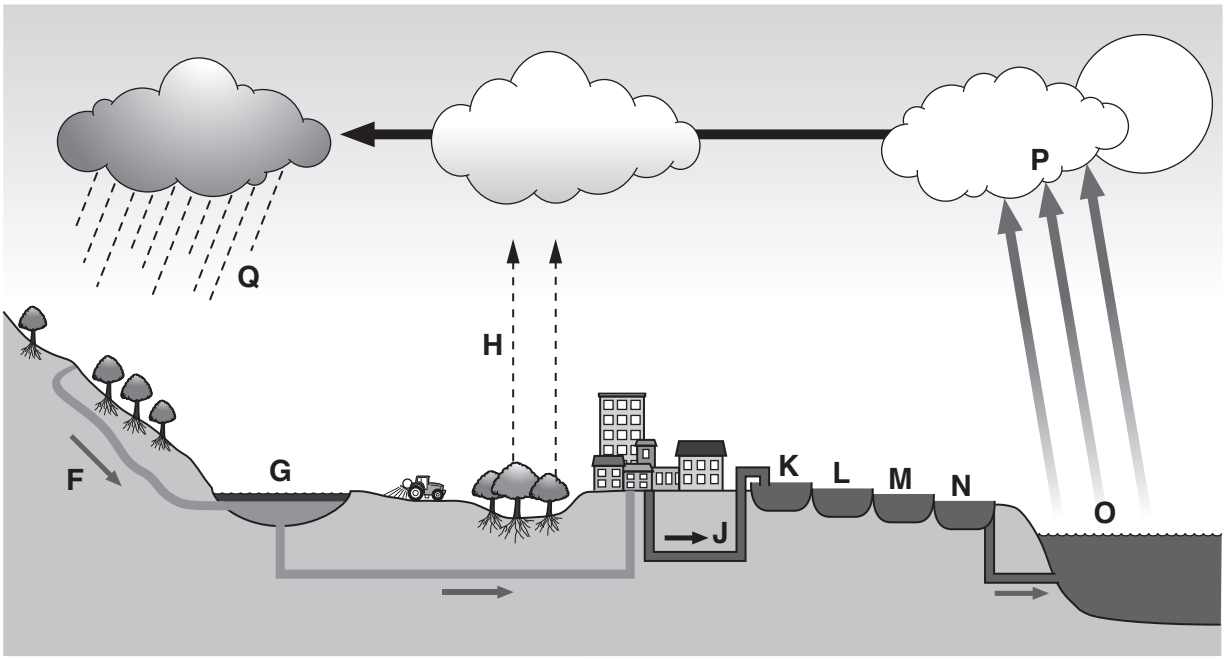

Fig. 1.1

Table 1.1 describes some of the processes in the water cycle.

Complete Table 1.1.

One row has been done for you.

Table 1.1

description	name of the process	letter in Fig. 1.1
nitrate ions are washed into rivers	leaching	**F**
an algal bloom in the water is caused by leaching of nitrate ions		
	evaporation	
conversion of water from a vapour to a liquid		
	transpiration	

[4]

(c) Polluted water can be purified at a sewage treatment works.

(i) State **one** reason why it is necessary to treat polluted water before it is used as drinking water.

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.....[1]

(ii) Outline the process of sewage treatment. You may use the letters in Fig. 1.1 in your answer.

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.....[4]

[Total: 12]

2 The Indian muntjac deer, *Muntiacus muntjak*, is recorded as the mammal with the lowest number of chromosomes.

Fig. 2.1 is an image of the chromosomes in the nucleus of a diploid cell of a female muntjac deer.

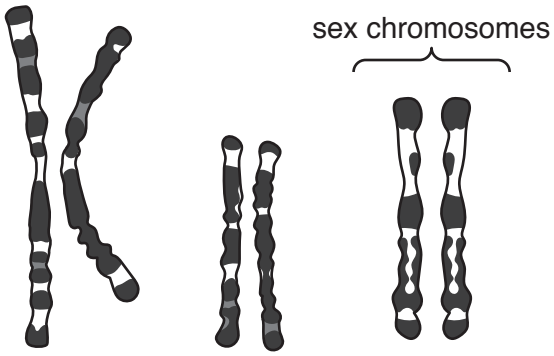

Fig. 2.1

(a) State the diploid number of chromosomes for the female muntjac deer.

..... [1]

(b) Fig. 2.2 is an image of the chromosomes in the nucleus of a diploid cell of a male muntjac deer.

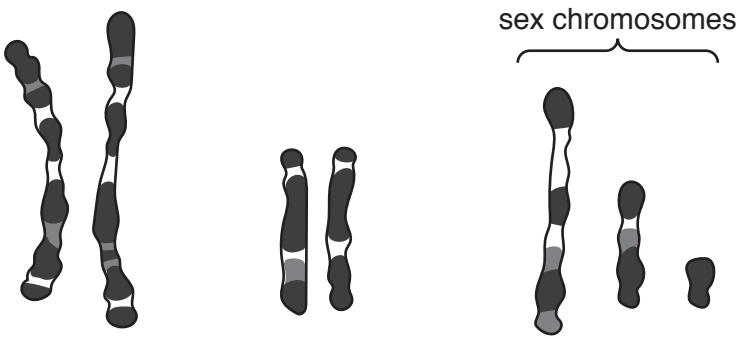

Fig. 2.2

Describe how the sex chromosomes of the male muntjac deer shown in Fig. 2.2 differ from those of the female shown in Fig. 2.1.

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.....[2]

(c) Explain how meiosis can result in variation in a species.

Use the words **chromosome** and **gametes** in your answer.

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.....[4]

(d) Another cause of variation is the formation of new alleles.

Describe how new alleles can be formed.

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.....[3]

[Total: 10]

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3 **(a)** Fig. 3.1 is a photomicrograph of part of the upper surface of a broad bean leaf, *Vicia faba*.

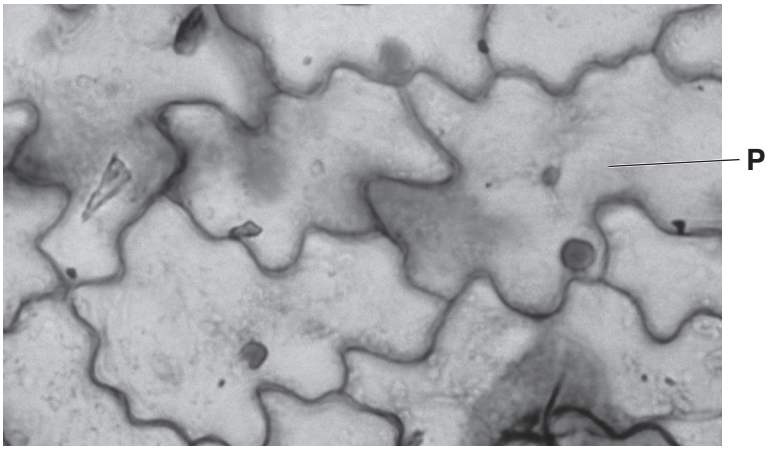

Fig. 3.1

(i) On Fig. 3.1, identify and label **two** structures that are visible in cell **P**. [2]

(ii) State the name of the tissue shown in Fig. 3.1.

.....[1]

(iii) The tissue shown in Fig. 3.1 is transparent.

Explain why it is important to the plant that the tissue shown in Fig. 3.1 is transparent.

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.....[3]

(b) Stomata are found on the lower surface of broad bean leaves.

Describe the function of stomata.

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.....[3]

(c) More than 40 years ago, botanists studied the leaves of broad bean plants and discovered that guard cells control the opening and closing of stomata. They found that stomata were open when the guard cells were turgid.

Table 3.1 shows some of their measurements.

Table 3.1

	closed stomata	open stomata
ion concentration in guard cells / pmol	0.3	2.5
guard cell volume / μm^3	4000.0	6500.0
turgor pressure in the guard cells / MPa	2.0	4.8
width of stomatal opening / μm	0.0	8.0

(i) Ions move into guard cells by active transport.

Describe how the ions move into the guard cells.

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.....[2]

(ii) Describe **and** explain how the change in ion concentration causes the guard cell volume to change. Use the information in Table 3.1 in your answer.

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.....[5]

(iii) The botanists left the broad bean plants unattended for three days. During this time the broad bean plants wilted.

Suggest **two** environmental factors that can cause plants to wilt.

1 .....

2 .....

[2]

[Total: 18]

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4 Glycogen is a storage carbohydrate in animals. Glycogen is made from glucose.

(a) (i) Cells that convert glucose to glycogen contain many mitochondria.

Suggest why these cells contain many mitochondria.

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.....

.....

.....[2]

(ii) State the type of biological molecule that catalyses reactions such as the conversion of glycogen to glucose.

.....[1]

(b) A fetus needs glucose to make glycogen.

Describe how a fetus obtains glucose.

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.....[3]

(c) Fig. 4. 1 shows the concentration of glycogen in the fetus of a domestic cat during pregnancy and immediately after birth.

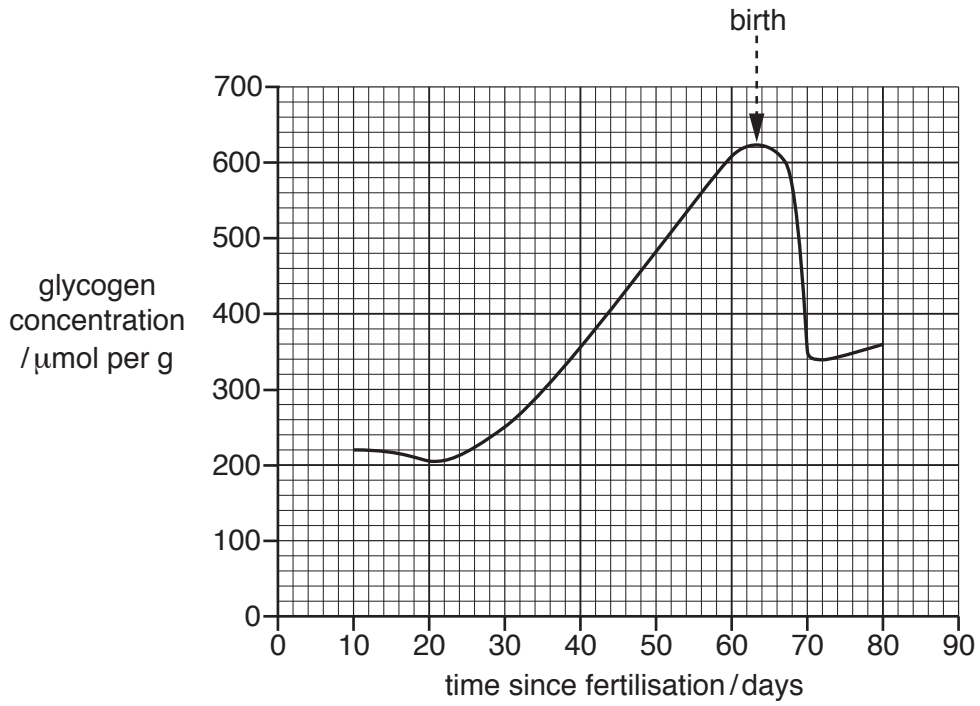

Fig. 4.1

Hormones stimulate changes in the concentration of glycogen in the fetus.

(i) Define the term *hormone*.

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.....[3]

(ii) Calculate the percentage increase in the glycogen concentration in the fetus between day 10 and birth in Fig. 4.1.

Give your answer to the nearest whole number.

Show your working.

..... %
[2]

(iii) Describe the changes in glycogen concentration shown in Fig. 4.1 **and** explain how hormones in the fetus cause these changes.

Use data from Fig. 4.1 to support your answer.

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.....[6]

(d) After birth, cats produce milk to feed their offspring.

Human babies can be breast-fed or bottle-fed with formula milk.

Outline **three** disadvantages of breast-feeding.

1 .....

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2 .....

.....

3 .....

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[3]

[Total: 20]

5 An ecologist studied variation in a species of xerophyte.

(a) Xerophytes are adapted to a particular type of environment.

State this type of environment.

.....[1]

(b) The ecologist studied the features of the leaves in the species of xerophyte.

Fig. 5.1 shows the variation in the type of leaf spike.

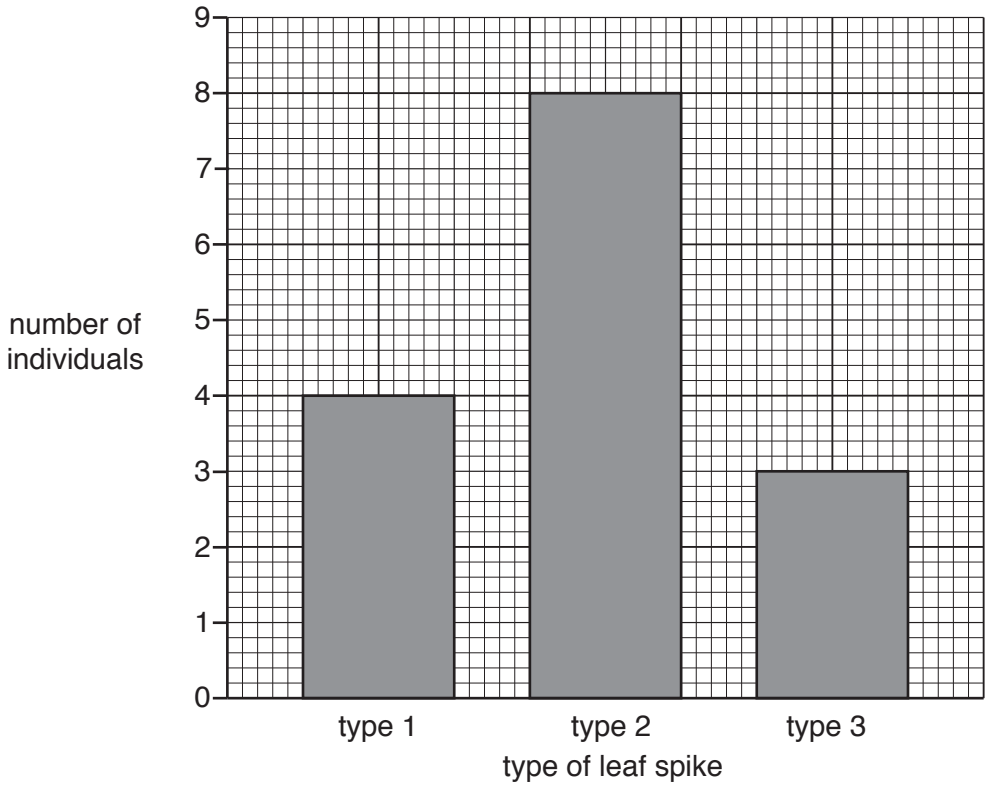

Fig. 5.1

(i) State the type of variation shown in Fig. 5.1.

.....[1]

(ii) Explain why the type of leaf spike is an example of the variation shown in Fig. 5.1.

.....

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.....[2]

(c) The ecologist also measured other features of the leaves.

Fig. 5.2 shows the variation in leaf feature **B**.

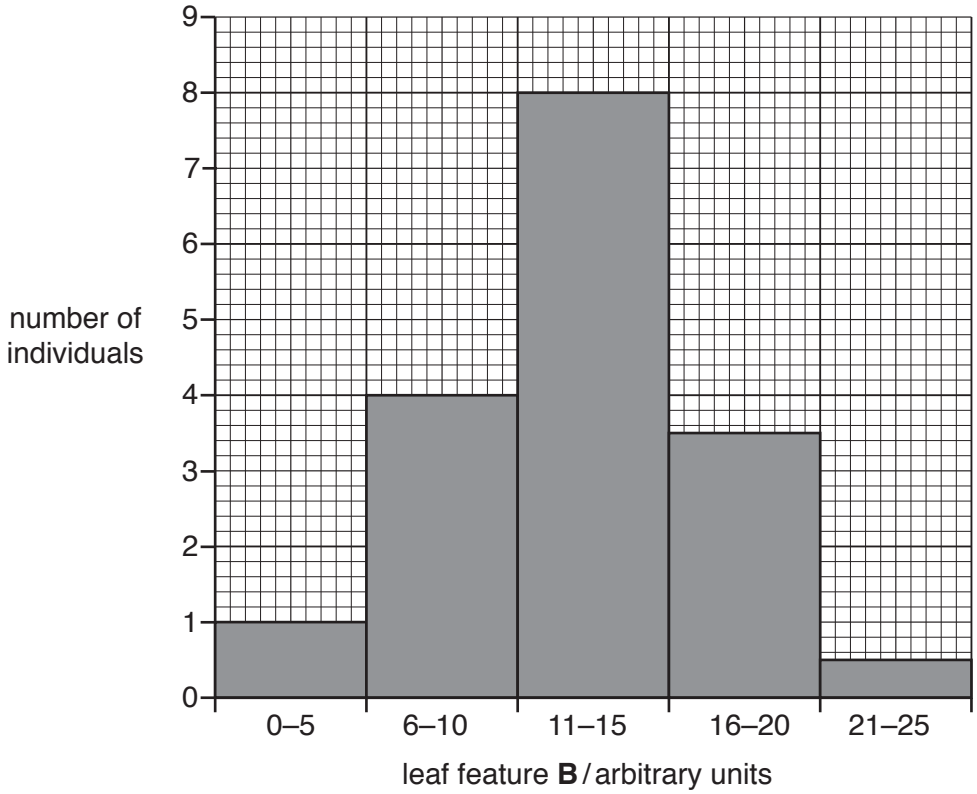

Fig. 5.2

State **two** named features of leaves that show the type of variation shown in Fig. 5.2.

1 .....

2 .....

[2]

(d) After one year, the ecologist recorded the variation in leaf feature **B** again.

The results are shown in Fig. 5.3.

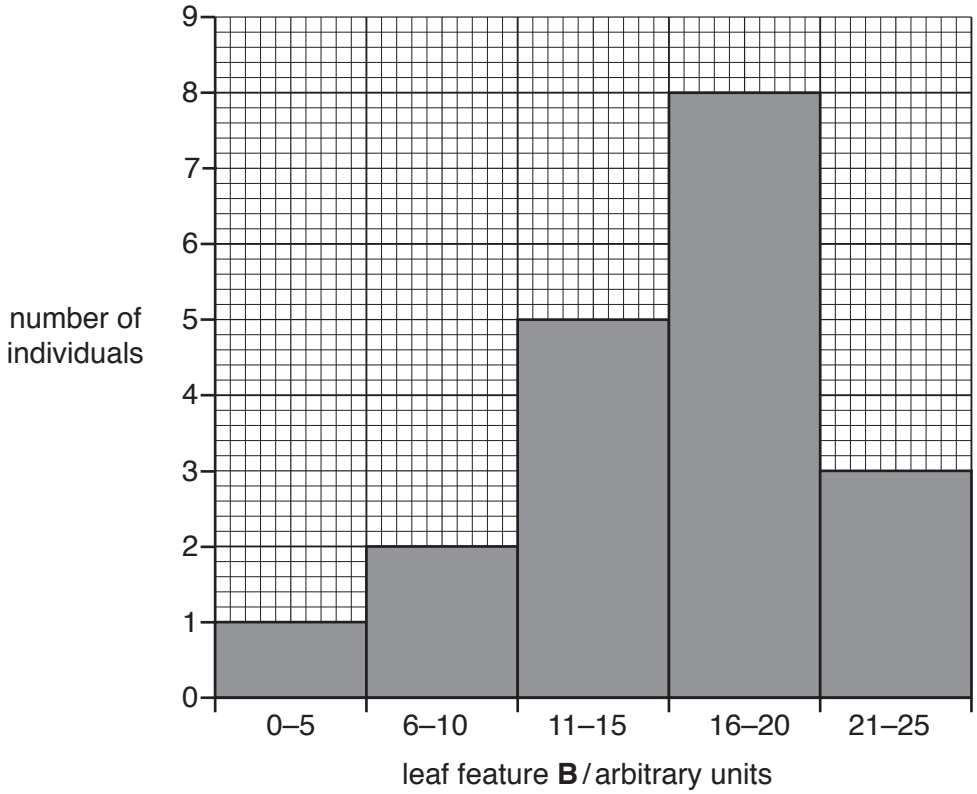

Fig. 5.3

Suggest **one** reason for the difference in variation of leaf feature **B** after one year.

.....

.....[1]

[Total: 7]

6 Fig. 6.1 is a diagram showing some body cells and parts of the human lymphatic and circulatory systems.

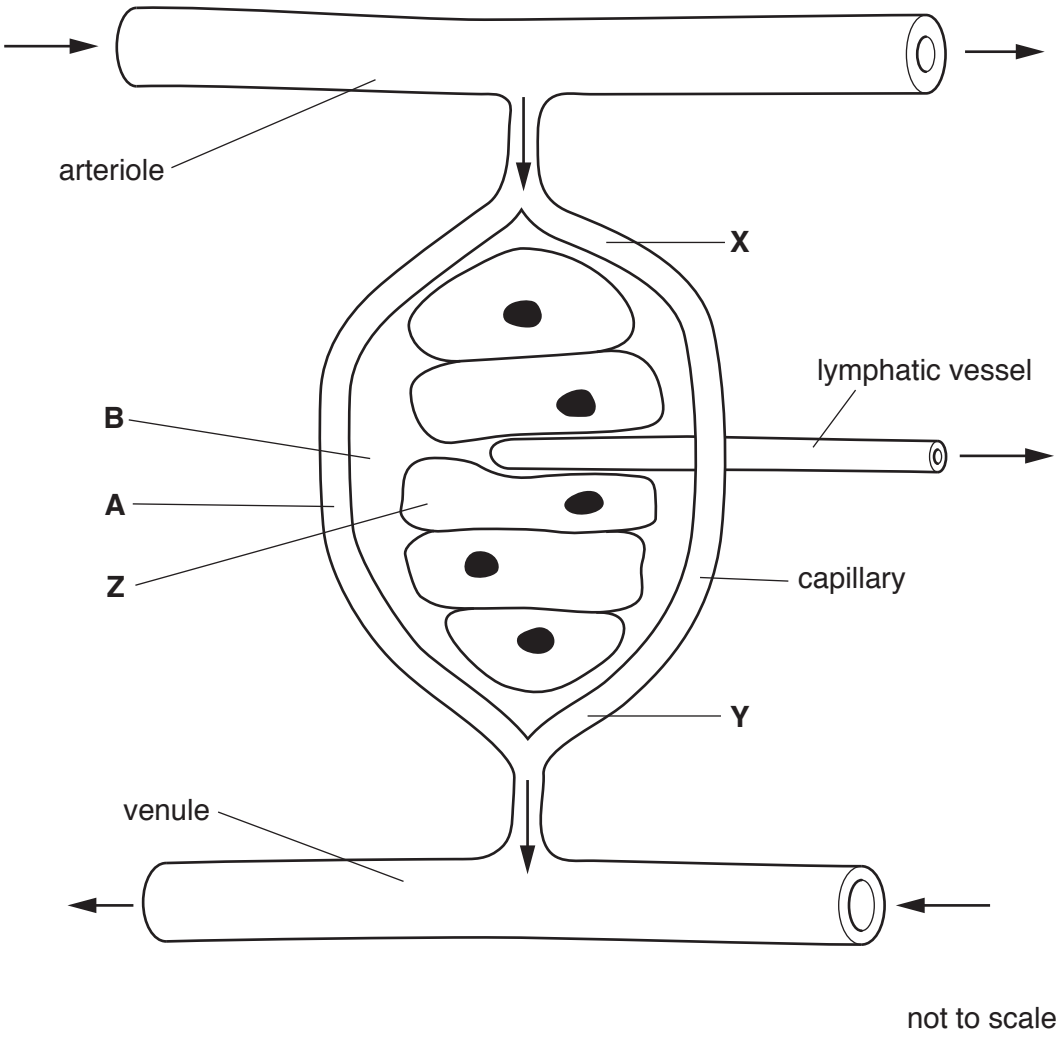

Fig. 6.1

(a) Capillaries allow blood to reach most cells in the body.

(i) State the name of the process by which oxygen moves from **A** to **Z** as shown in Fig. 6.1.

.....[1]

(ii) Describe how some of the liquid in **A** moves to **B** in Fig. 6.1.

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.....[2]

(iii) State **one** component of blood that remains inside the capillaries as the blood flows from **X** to **Y** in Fig. 6.1.

.....[1]

(b) Lymphatic vessels are similar in structure to veins.

(i) Describe the structure of veins.

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.....[2]

(ii) Describe the role of the lymphatic vessel shown in Fig. 6.1.

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.....[2]

(c) Lacteals are another part of the lymphatic system.

State where in the body lacteals are found and state their function.

location in the body .....

function .....

.....

[2]

(d) In the lymphatic system, there are structures that contain large numbers of lymphocytes.

(i) State the name of these structures.

.....[1]

(ii) State the role of lymphocytes.

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.....[2]

[Total: 13]

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