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Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER | | | | | |

CANDIDATE NUMBER | | | | |

5607021604

BIOLOGY **0610/22**

Paper 2 Core **May/June 2015**

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.

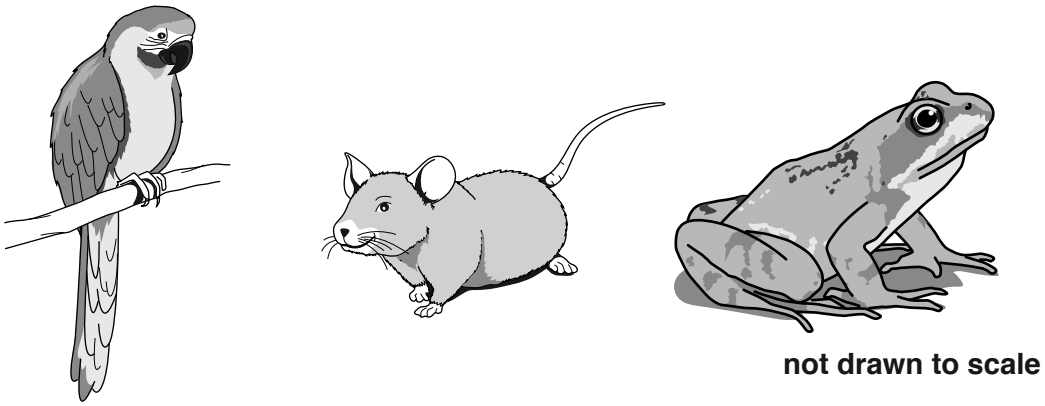
The syllabus is approved for use in England, Wales and Northern Ireland as a Cambridge International Level 1/Level 2 Certificate.

This document consists of **19** printed pages and **1** blank page.

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1 Fig. 1.1 shows three vertebrates. Each is from a different class (group) of vertebrate.



not drawn to scale

Fig. 1.1

(a) State **one** characteristic of all vertebrates.

.....[1]

(b) (i) Name the **two** other classes of vertebrate **not** shown in Fig. 1.1.

1 .....

2 .....
[2]

(ii) Name the feature which covers the surface of the bodies of animals in these two classes but **not** the three animals shown in Fig. 1.1.

.....[1]

[Total: 4]

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Question 2 begins on page 4.

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2 **(a)** Complete the following paragraph about enzymes. Choose words from this list.

Use each word only once or not at all.

activators	**catalysts**	**enzymes**
protein	**reactions**	**unusual**

All enzymes are made of ..... molecules. They control the metabolic ..... in living organisms. The enzymes act as ..... as they speed up processes but are not permanently changed. [3]

(b) Enzymes are important in chemical digestion.

Define the term *digestion*.

.....

.....

.....

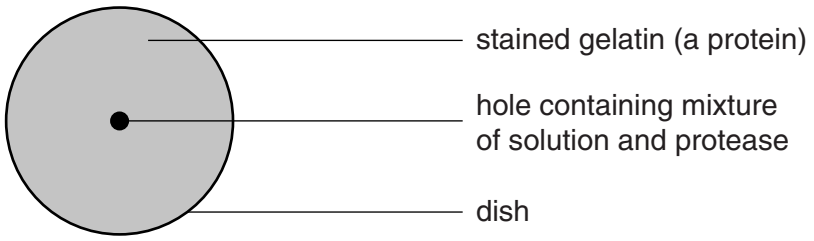
.....

.....[2]

(c) In an investigation to measure the effect of pH on enzyme activity, a protease enzyme was mixed with solutions of different pH values. The mixtures were placed in holes cut in the centre of dishes of gelatin.

Gelatin is a protein which can be stained with a coloured dye. When the protease digests the gelatin a colourless zone forms.

Fig. 2.1 shows a dish at the start of the experiment. Fig. 2.2 shows the dishes after a period of 24 hours.



at the start

Fig. 2.1

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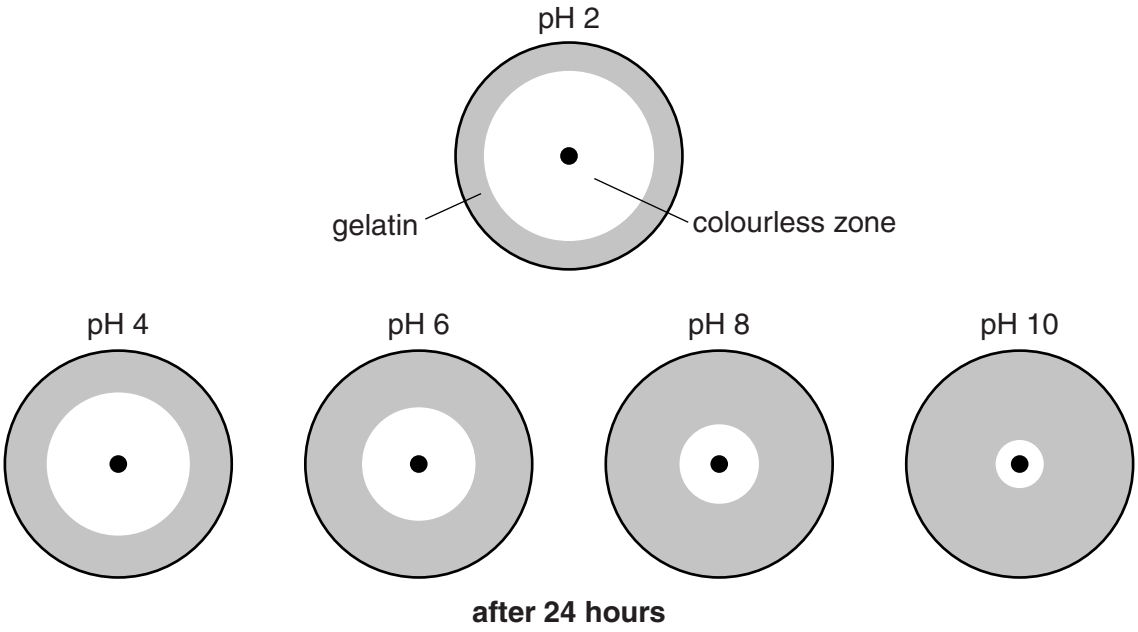


Fig. 2.2

(i) Using Fig. 2.2, state the optimum (best) pH for the activity of this protease. .....[1]

(ii) Suggest the region of the alimentary canal in which this protease carries out its function.

.....[1]

(iii) Complete the equation to explain how the protease caused the colourless zones to appear.

..... $\xrightarrow{\text{protease}}$ ..... [2]

(d) The experiment was carried out at 20° C.

Suggest what would happen if the experiment was carried out at 30° C.

.....

.....

.....[1]

[Total: 10]

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3 Fig. 3.1 shows the excretory system in a human male.

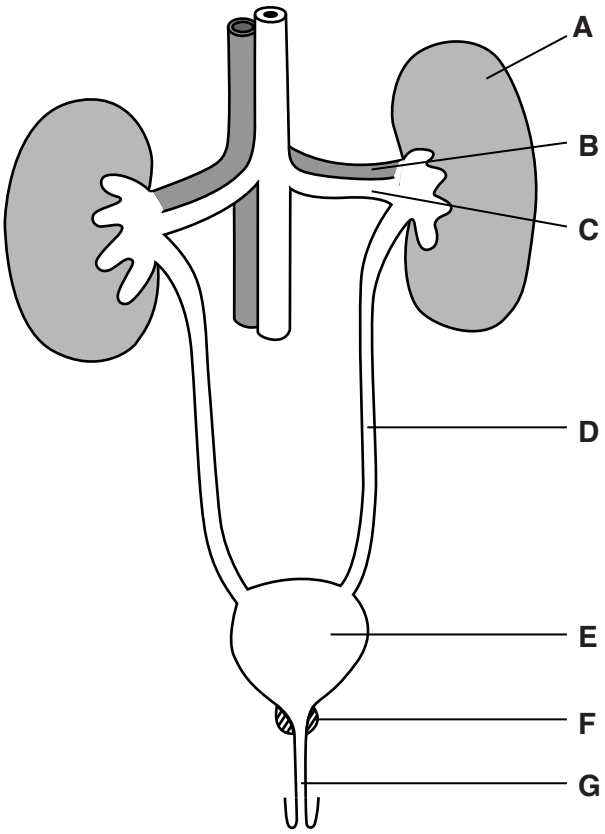


Fig. 3.1

(a) Table 3.1 shows five functions of parts of the excretory system. Complete the table by:

- naming the part that carries out each of the functions
- using the letters from Fig. 3.1 to identify the structures named.

Table 3.1

description of function	name	letter on Fig. 3.1
carries urine and sperm out of the body		**G**
filters urea and other wastes from the blood	kidney	
stores urine until it is convenient to expel it		**E**
carries blood with a high urea content	renal artery	
carries urine away from the kidney		**D**

[5]

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(b) Urine contains urea.

(i) State where urea is produced in the body.

.....[1]

(ii) Name the substance which is broken down to produce urea.

.....[1]

Table 3.2 compares the amounts of four different substances in blood plasma and urine.

Table 3.2

substance	quantity / percentage per 100 cm^3 of fluid	
	blood plasma	urine
water	91.50	95.50
urea	0.03	2.10
glucose	0.10	0.00
salts	0.41	0.61

(iii) Use the information in Table 3.2 to describe how blood plasma differs from urine.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 10]

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Question 4 begins on page 9.

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4 **(a)** Cystic fibrosis is an inherited disease. A person with cystic fibrosis produces mucus which is very sticky.

(i) The mucus affects the function of the cilia in the air passages.

Suggest what effects this will have on the person with this condition.

.....

.....

.....

.....

.....[2]

(ii) The sticky mucus can also block the tube from the pancreas to the small intestine.

Explain why this affects the digestion of fats in a person with cystic fibrosis.

.....

.....

.....

.....

.....[2]

(b) Cystic fibrosis is caused by a recessive allele.

State what is meant by the term *allele*.

.....

.....

.....[1]

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[Turn over

Fig. 4.1 shows a family tree where one child has cystic fibrosis.

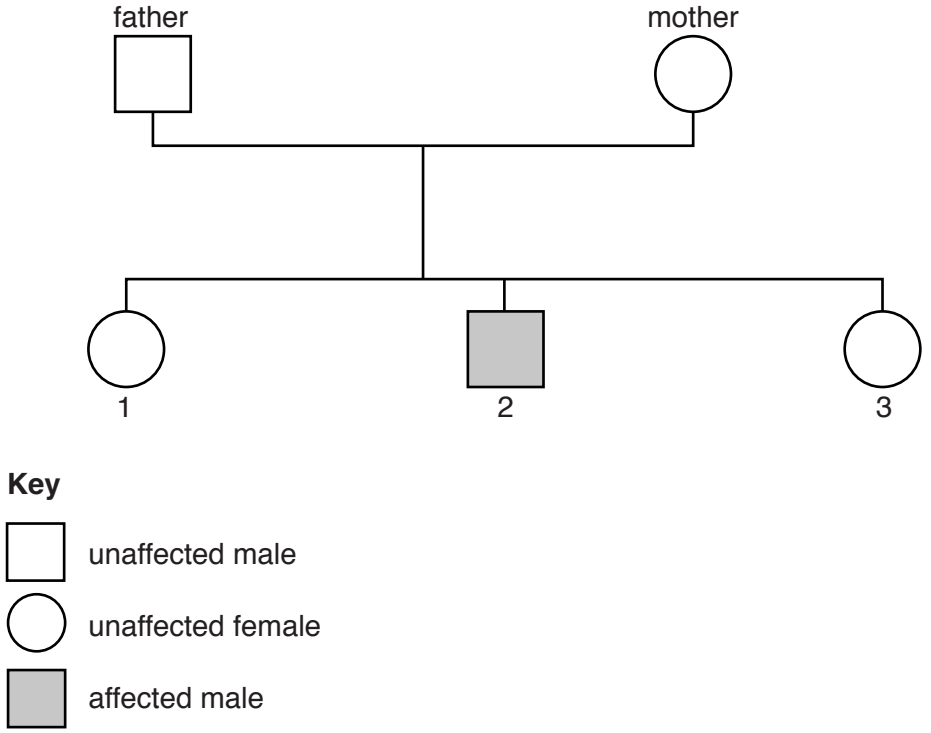


Fig. 4.1

(c) Using the symbols **N** for the dominant allele and **n** for the recessive allele:

(i) state the genotypes of the parents

father ……

mother ……

[2]

(ii) state the genotype of child 2 …… [1]

(iii) state the possible genotypes of child 1 and child 3.

child 1 ……

child 3 ……

[2]

(d) The parents have another child.

What is the probability (chance) that the child will have cystic fibrosis?

.....[1]

[Total: 11]

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5 **(a)** Fig. 5.1 shows a tomato seed.

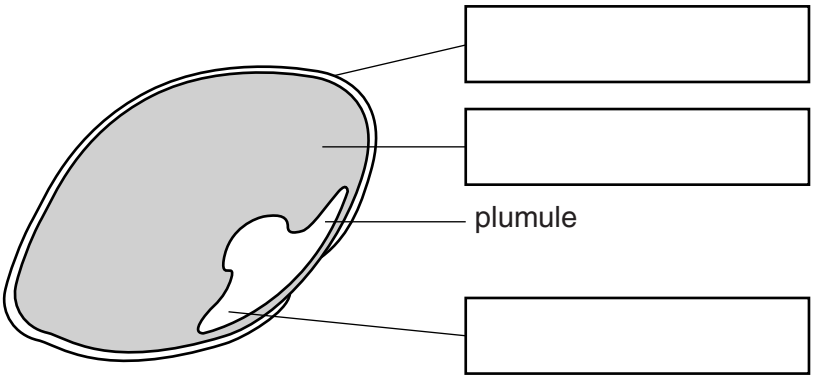


Fig. 5.1

Label the three parts of the seed indicated by the label lines.

Write your answers in the boxes on Fig. 5.1. [3]

(b) Fig. 5.2 shows a section through a tomato fruit.

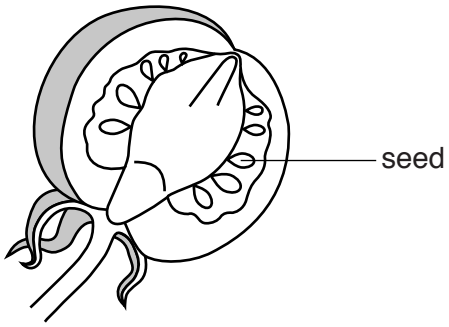


Fig. 5.2

(i) The seeds inside the tomato fruit have a hard outer layer.

Suggest why this layer is important to the seed.

.....

.....[1]

(ii) Suggest how these seeds are dispersed successfully from the parent plant.

.....

.....

.....

.....

.....[2]

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[Turn over

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(c) One stage in the development of a flowering plant is the germination of seeds.

(i) Define the term *development*.

.....

.....

.....[1]

(ii) Fig. 5.3 shows an experiment which was set up to investigate the conditions required for germination.

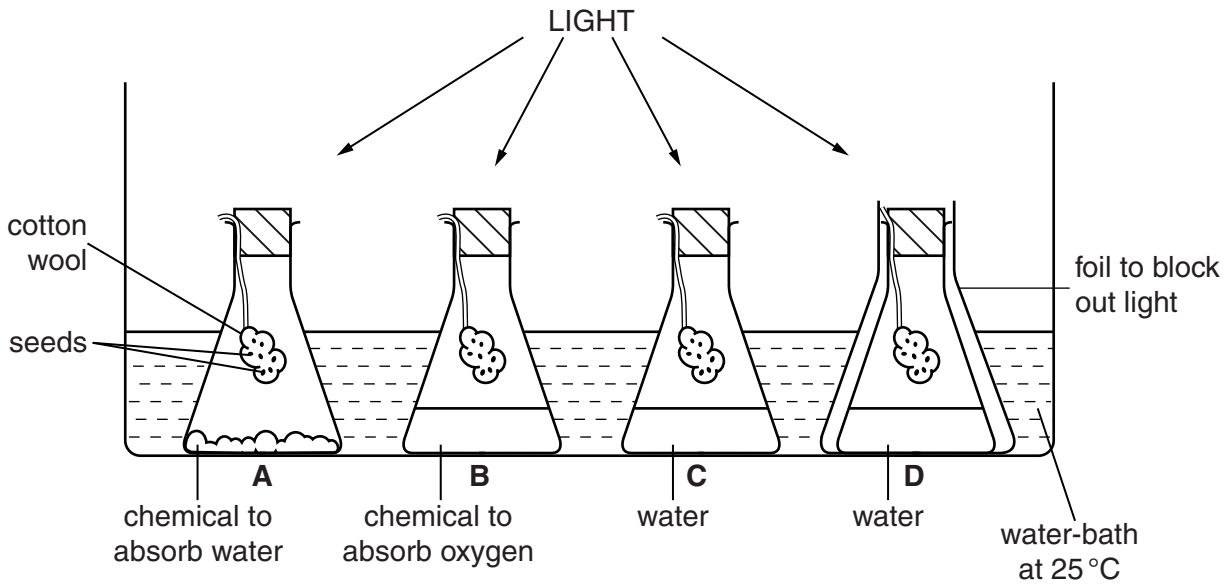


Fig. 5.3

The seeds in flask **A** are in dry cotton wool. The seeds in flasks **B**, **C**, and **D** are in damp cotton wool.

Some of the seeds will germinate and some will not.

Complete Table 5.1 by stating whether the seeds in flasks **A**, **B**, **C** and **D** will germinate or not.

Explain your answers.

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Table 5.1

flask	will the seeds germinate? write YES or NO	explanation
A		
B		
C		
D		

[5]

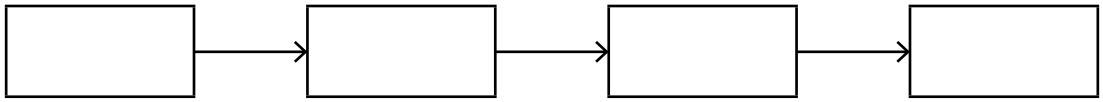
[Total: 12]

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6 Some students observed a number of organisms in a habitat.

They saw that beetles eat plants, snakes eat frogs and frogs eat beetles.

(a) Write out a food chain linking these organisms. Write your answers in the boxes.



[1]

(b) Fig. 6.1 shows the population growth curve for the frog population over several years.

(i) The population curve shown in Fig. 6.1 has four phases.

Identify the four phases, **P**, **Q**, **R** and **S**, and write your answers in the boxes provided.

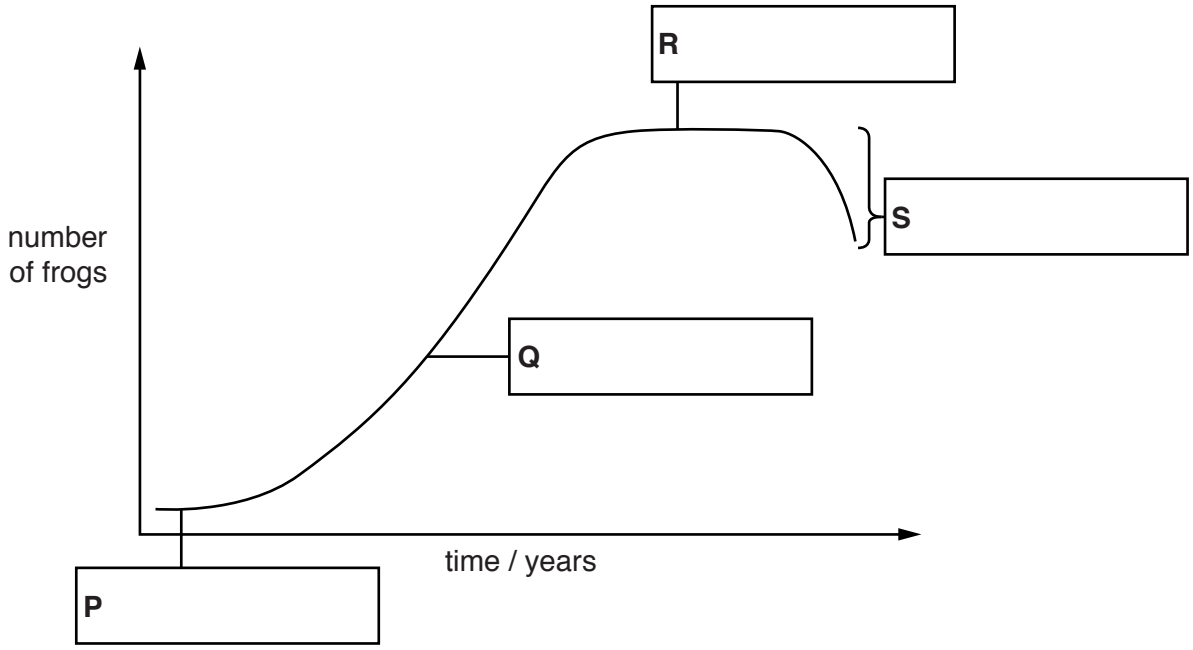


Fig. 6.1

[4]

(ii) Using information from your food chain in part **(a)**, and your knowledge of factors that affect population growth, suggest reasons for the shape of the curve in the region marked **S** on Fig. 6.1.

.....

.....

.....

.....

.....

.....

.....[3]

[Total: 8]

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7 The list of words and phrases is about the relationships of organisms with one another and with their environment.

carnivore **decomposer** **ecosystem** **food chain**

food web **herbivore** **population** **producer** **pyramid of numbers**

pyramid of biomass **trophic level**

Table 7.1 shows a list of definitions of some of these words and phrases.

Match each definition with one word or phrase from the list. Write your answers in Table 7.1.

Each word may be used once, more than once or not at all.

Table 7.1

definition	matching word or phrase
an animal that gets its energy by eating other animals	
a network of interconnected food chains	
an organism that makes its own organic nutrients by photosynthesis	
the position of an organism in a food chain	
an animal that gets its energy by eating plants	
a group of organisms of one species, living in the same area at the same time	
a unit containing all of the organisms and their environment, interacting together, in a given area	
a diagram which shows the quantities of organisms involved in a set of feeding relationships	

[8]

[Total: 8]

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8 Fig. 8.1 shows different plant cells **A**, **B**, **C**, **D**, and **E**.

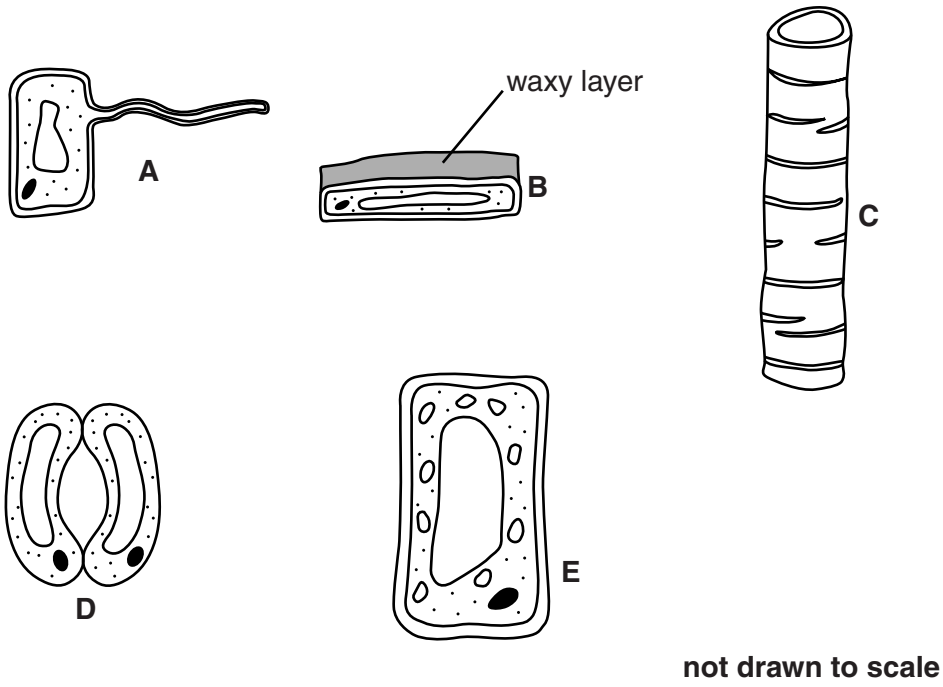


Fig. 8.1

(a) Fig. 8.2 shows a plant.

Use the letters **A**, **B**, **C**, **D**, and **E** from Fig. 8.1 to show where these cells would be found on the plant shown in Fig. 8.2.

Write each of the letters in the appropriate box. One box will be left blank.

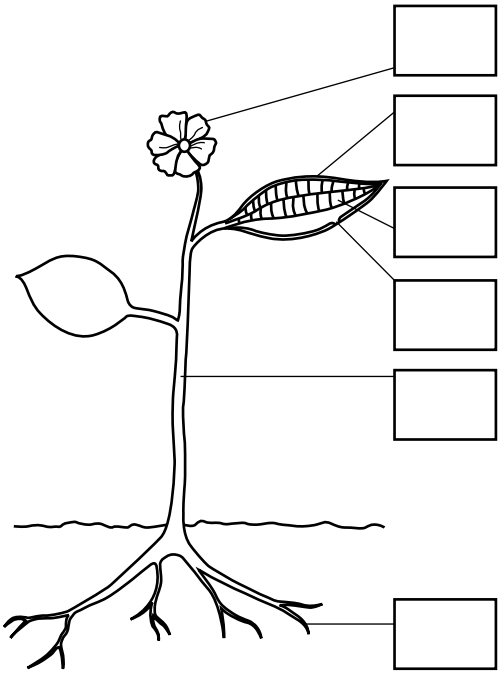


Fig. 8.2

[5]

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(b) Explain how the structures of cells **A** and **E** are related to their functions.

.....

.....

.....

.....

.....

.....

.....

.....

.....[4]

[Total: 9]

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[Turn over

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9 **(a)** Fig. 9.1 represents two liquids, **A** and **B**, separated by a partially permeable membrane.

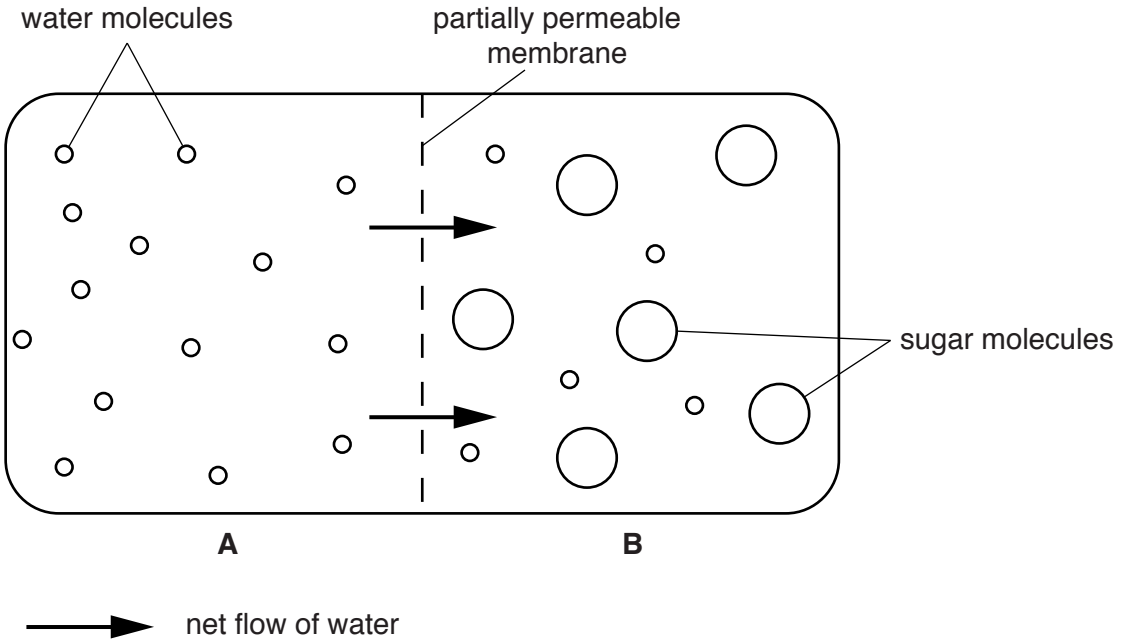


Fig. 9.1

A is pure water and **B** is a sugar solution.

In the human alimentary canal, water moves from the colon into the blood.

Use the information in Fig. 9.1 to explain the movement of water from the colon into the blood.

.....

.....

.....

.....

.....

.....

.....[3]

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(b) The ratio of the surface area to the volume of a cell affects the rate of diffusion of a substance into the cell.

The results of an investigation on diffusion into a cube-shaped cell are shown in Table 9.1.

(i) Complete Table 9.1. One of the rows has been done for you.

Table 9.1

length of side of cube /mm	time taken for substance to diffuse to centre of cell /s	surface area of cube /mm^2 (total of 6 sides)	volume of cube /mm^3	surface area to volume ratio
1	20	6	1	6:1
2	41			
3	76			

[2]

(ii) Suggest how surface area to volume ratio affects the efficiency of diffusion.

.....

.....

.....[1]

(c) Explain **one** way that the lungs of a mammal are adapted to increase the rate of diffusion of oxygen from the alveoli to the blood.

.....

.....

.....

.....

.....[2]

[Total: 8]

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