Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME									
CENTRE NUMBER						CANDIDATE NUMBER				

1314985603

BIOLOGY **0610/43**

Paper 4 Theory (Extended) **May/June 2016**

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 **18** printed pages and **2** blank pages.

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1 **(a)** Fig. 1.1 shows the human gas exchange system. The functions of the parts of the gas exchange system are given in Table 1.1.

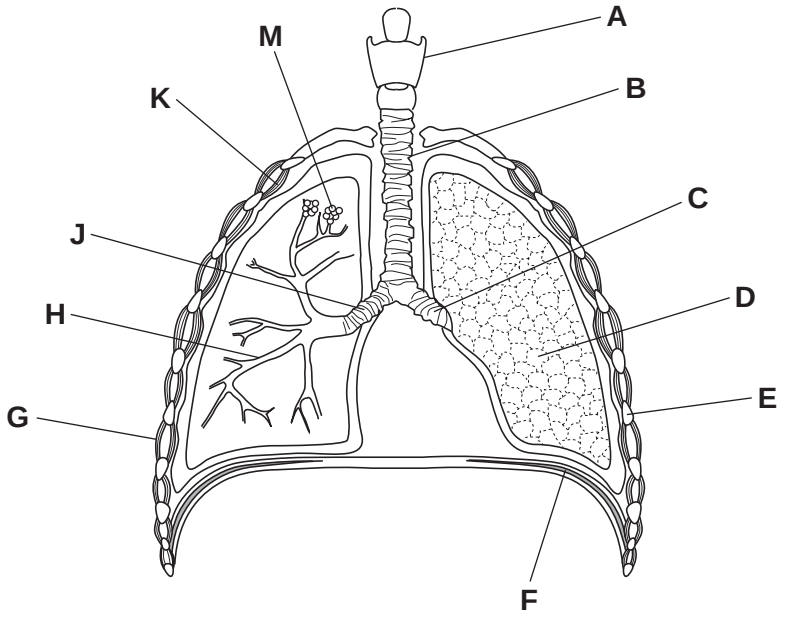


Fig. 1.1

Complete Table 1.1. One row has been done for you.

Table 1.1

function	letter on Fig. 1.1	name
structure that makes sounds	**A**	larynx
bone that provides protection for the lungs		
airway that allows passage of air only into the right lung		
airway that allows passage of air into both lungs		
contracts to increase volume of thorax		
muscle that contracts to lower the ribcage		
site of gas exchange		

[6]

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(b) The gas exchange system contains cartilage.

Describe the function of cartilage in the gas exchange system.

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.....

..... [2]

(c) Soon after starting physical activity the concentration of carbon dioxide in the blood increases.

(i) Name the process inside cells that produces carbon dioxide.

.....

..... [1]

(ii) State the effect on breathing of an increase in carbon dioxide concentration in the blood.

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..... [1]

(iii) Explain how this effect on breathing is coordinated.

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..... [3]

[Total: 13]

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2 Fig. 2.1 is a flow chart that shows the events that occur as light travels through the eye.

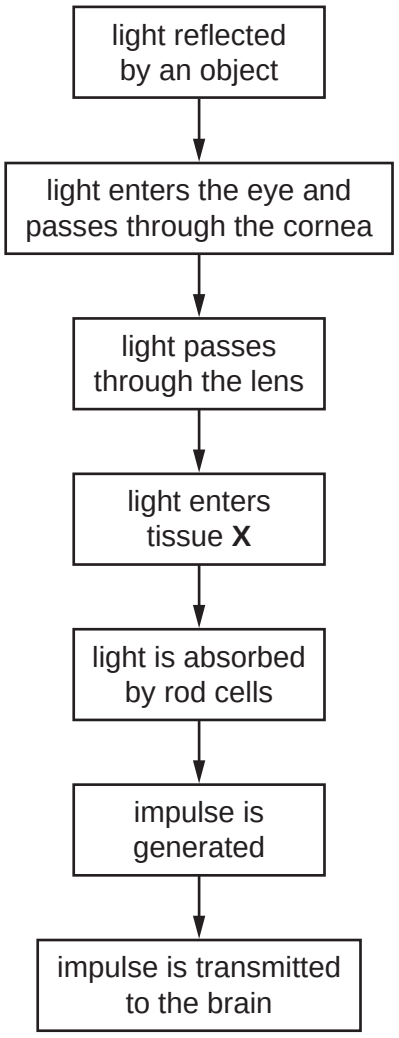


Fig. 2.1

(a) **(i)** State the name of the tissue **X**.

..... [1]

(ii) State the name of the nerve that transmits impulses from the eye to the brain.

..... [1]

(iii) State what happens to rays of light as they enter the cornea and the lens.

..... [1]

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(iv) Describe the role of rod cells.

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..... [2]

(b) A plant, *Arabidopsis thaliana*, was placed on its side in the dark. Fig. 2.2 is a series of drawings made of the plant, over seven days, as it responded to a change in its surroundings.

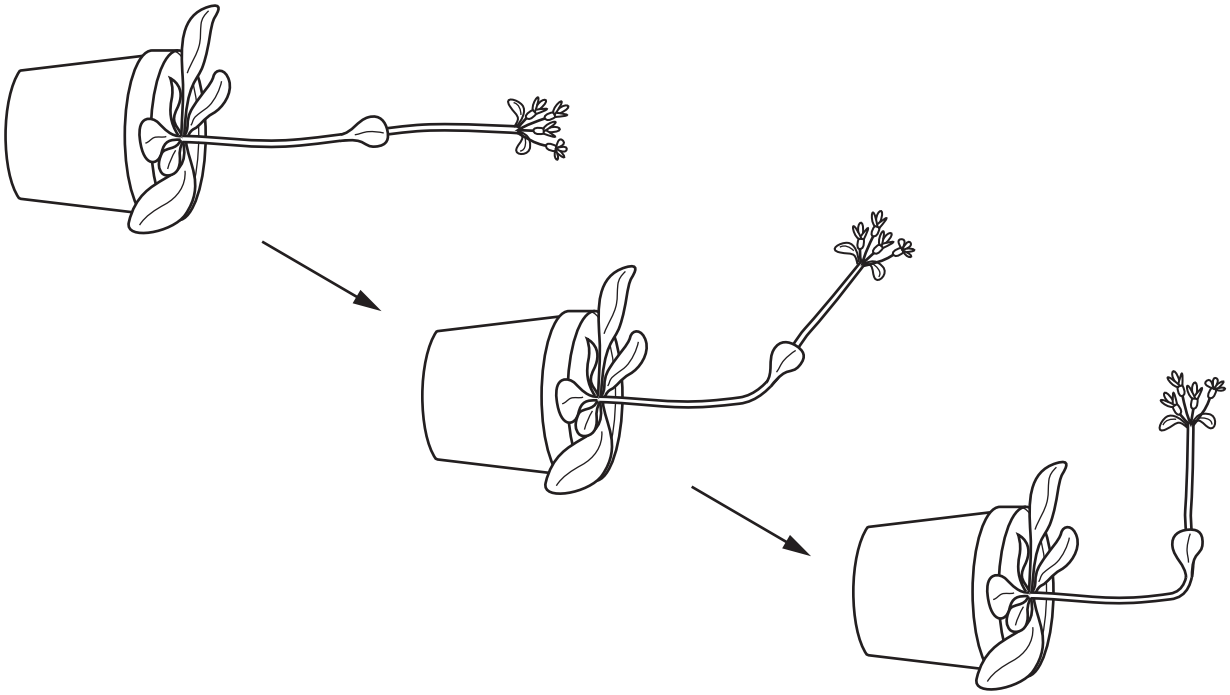


Fig. 2.2

(i) State the stimulus to which the plant responded.

..... [1]

(ii) Name the growth response shown by the plant.

..... [2]

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(iii) Explain the advantage to plants of the growth response shown in Fig. 2.2.

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..... [2]

(iv) Auxins control the growth responses of seedlings.

Explain how auxins control the growth response of *A. thaliana*, shown in Fig. 2.2.

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..... [4]

[Total: 14]

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3 **(a)** Sex in cats is determined in the same way as in humans.

Complete the diagram below to show how sex is determined in cats.

male cat × female cat

		female cat (XX)	
	gametes	X	X
male cat (.....)	.....		
	.....		

offspring ratio..... [3]

(b) A scientist investigated the inheritance of fur colour in cats.

The gene for coat colour is located on the X chromosome. The gene has two alleles:

- **B** black
- **b** orange.

The X chromosome with the allele for black is represented by $\mathbf{X^B}$.
The X chromosome with the allele for orange is $\mathbf{X^b}$.

A female cat can be a mixture of these colours, described as calico.

Fig. 3.1 shows the inheritance of this condition in a family of cats.

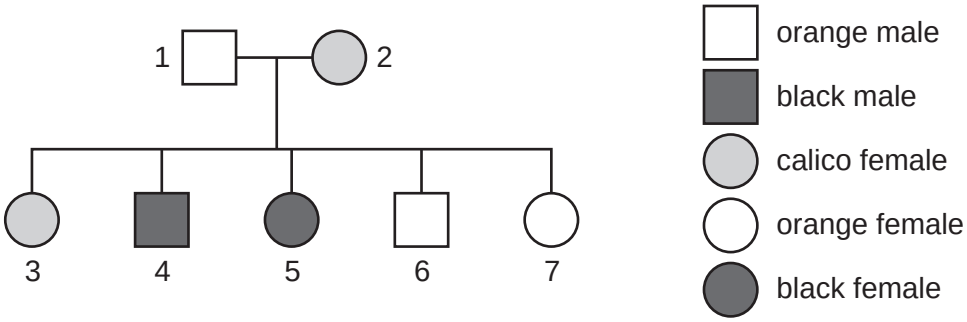


Fig. 3.1

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(i) State the genotypes of cats 1, 4, and 5 in Fig. 3.1.

cat 1 .....

cat 4 .....

cat 5 ..... [3]

(ii) Coat colour in cats is an example of discontinuous variation.

Explain why coat colour is an example of discontinuous variation.

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..... [3]

[Total: 9]

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4 A student investigated the diffusion of substances through Visking tubing, an artificial membrane which has some of the properties of cell membranes.

The student made a bag of Visking tubing as shown in Fig. 4.1.

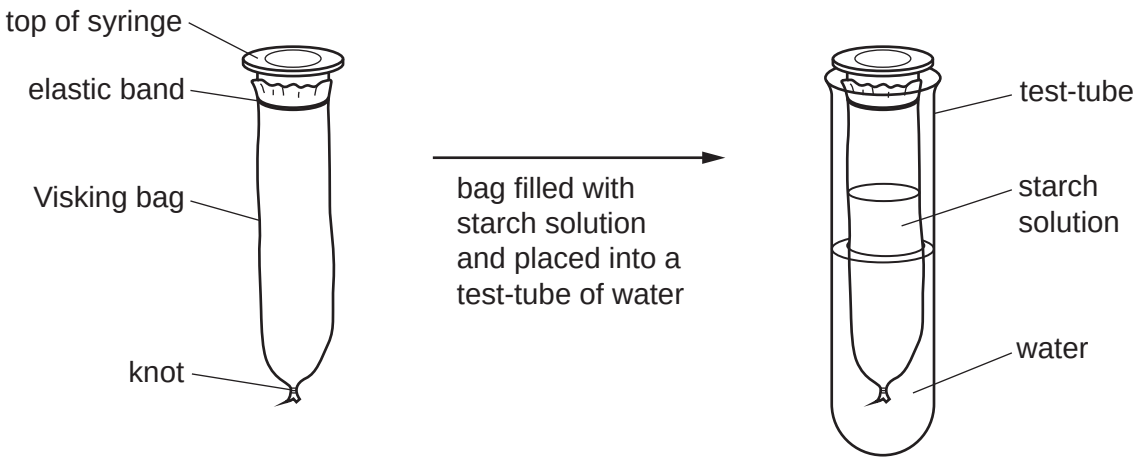


Fig. 4.1

The student added some iodine solution to the water in the test-tube.

After 30 minutes at room temperature, the contents of the Visking bag were stained blue-black, but the water outside remained a yellow colour.

(a) **(i)** Explain these results.

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..... [4]

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(ii) State **three** factors that influence the movement of molecules through membranes.

1 .....

2 .....

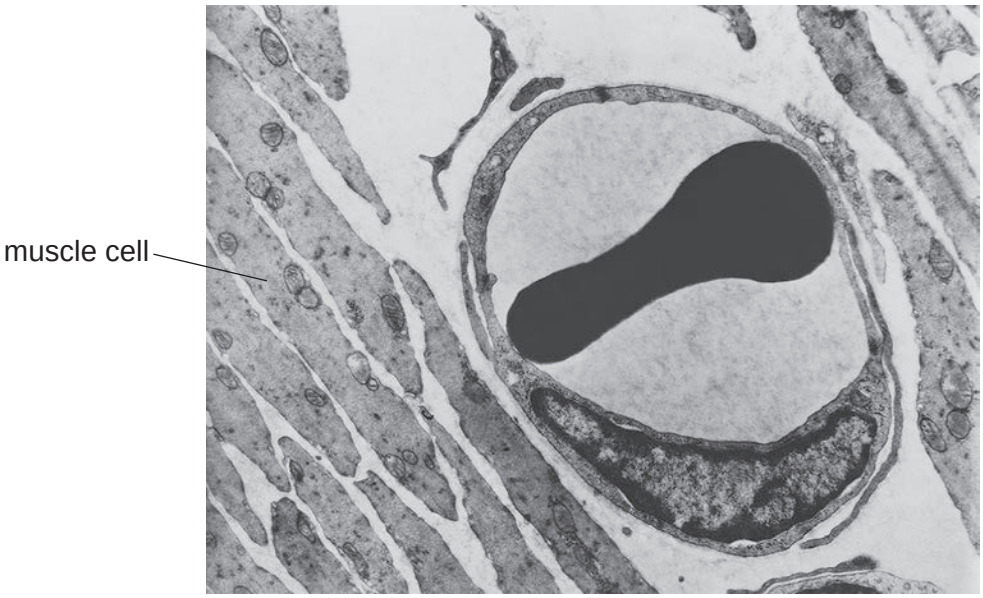
3 .....

[3]

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[Turn over

(b) Fig. 4.2 is an electron micrograph of a red blood cell within a capillary.



magnification ×6500

Fig. 4.2

(i) Molecules of carbon dioxide that are produced in muscle cells are transported to the blood.

Describe the pathway taken by these molecules of carbon dioxide.

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..... [3]

(ii) Explain how capillaries are adapted for their functions.

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..... [3]

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(c) Mammals have a transport system for carbon dioxide. Plants absorb carbon dioxide from their surroundings to use in photosynthesis.

Explain how a molecule of carbon dioxide from the atmosphere reaches the site of photosynthesis in a leaf.

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..... [4]

[Total: 17]

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5 Fig. 5.1 shows an area of forest where some of the trees have been cut down.

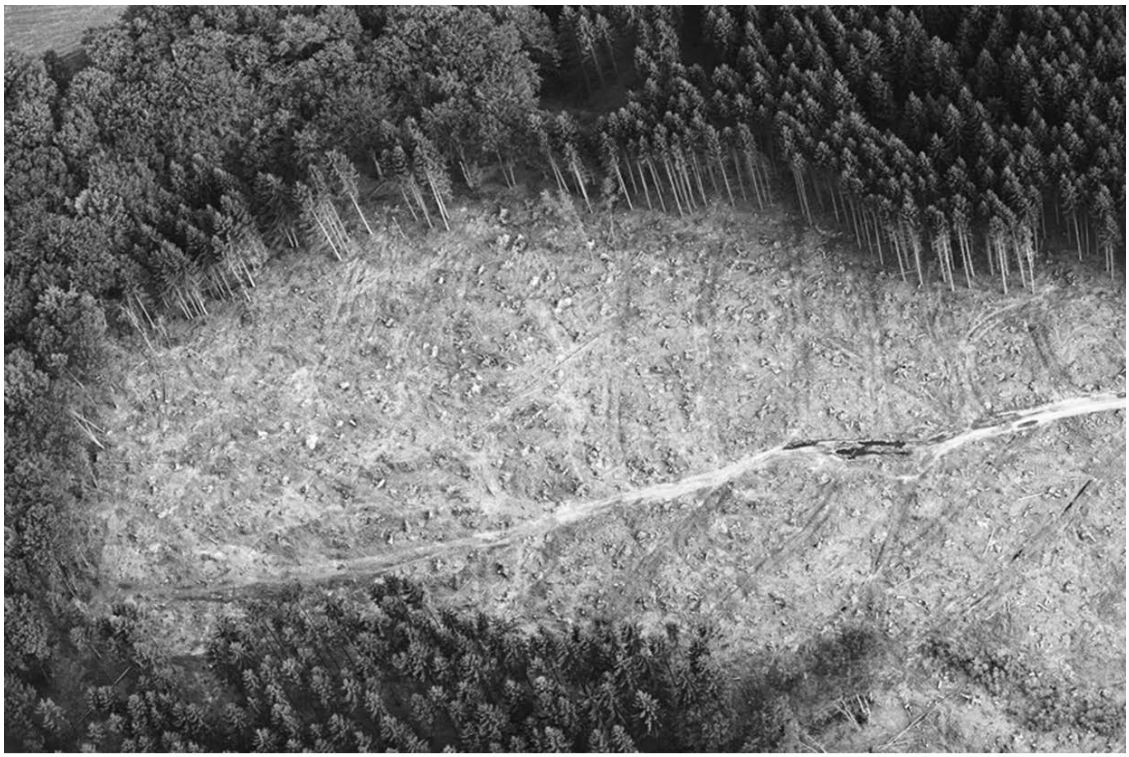


Fig. 5.1

(a) Explain the reasons why forests may be cut down as shown in Fig. 5.1.

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..... [3]

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(b) The loss of forests from parts of the world is assessed by satellite imagery. Table 5.1 shows data on the forests in Indonesia and Malaysia, two countries in South-East Asia which have large areas of forest.

Table 5.1

country	type of forest	area / thousands of hectares			
		1990	**2000**	**2005**	**2010**
Indonesia	natural forest	118 545	95 737	94 158	90 883
Malaysia	natural forest	20 420	19 932	19 317	18 649

(i) Calculate the percentage loss of natural forest in Indonesia between 1990 and 2010. Show your working and express your answer to the nearest whole number.

..... % [3]

(ii) Use the data in Table 5.1 to compare the loss of natural forest in Indonesia with the loss of natural forest in Malaysia.

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..... [3]

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(iii) Many hectares of natural forest have been cleared in countries such as Malaysia and Indonesia for oil palm plantations. Both countries have also replanted forests to grow timber and other forest products.

Suggest why replanted forests and plantations are **less** useful for conservation than natural forest.

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(c) Discuss the effects of deforestation on areas of land.

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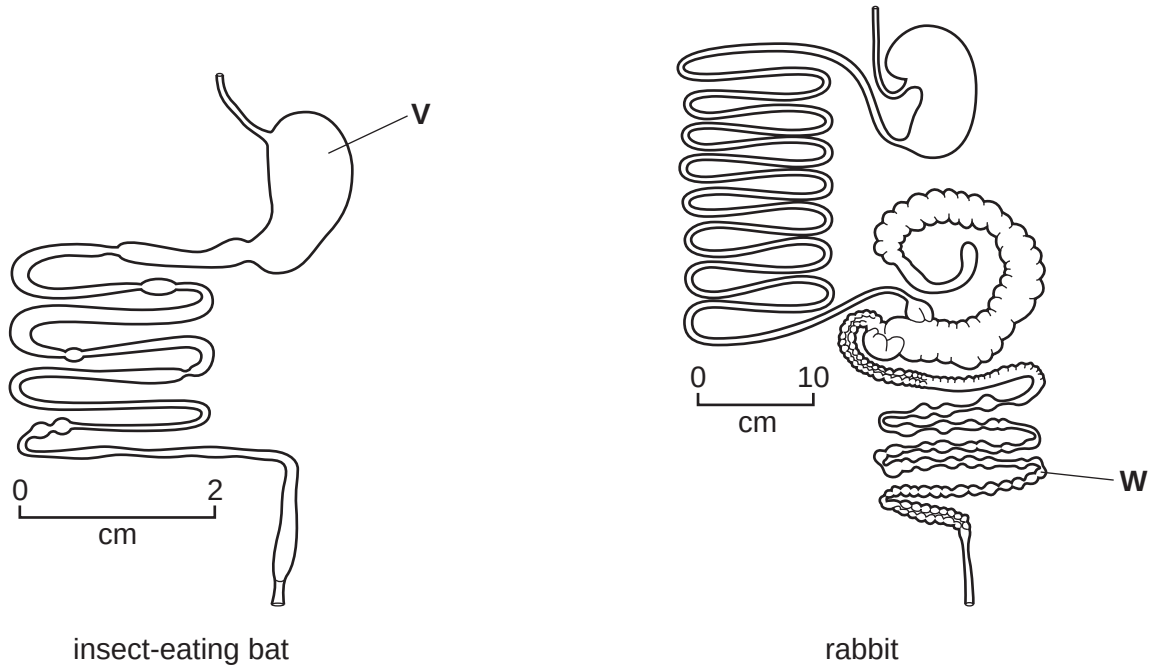
.....

..... [6]

[Total: 18]

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6 Fig. 6.1 shows the alimentary canals of two mammals, an insect-eating bat, which is a carnivore, and a rabbit, which is a herbivore.



insect-eating bat rabbit

Fig. 6.1

(a) Name the organs labelled **V** and **W**.

V .....

W .....

[2]

(b) Explain the role of mechanical digestion.

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..... [3]

Scientists investigated digestion in different species of mammal. The mammals that they studied ranged in size from an elephant shrew, *Elephantulus edwardii*, with a mass of 50 g to an ox, *Bos taurus*, with a mass of 220 kg.

The scientists added indigestible particles to the animals' food and timed how long the particles stayed in the digestive system.

The results for 24 different mammal species are shown in Fig. 6.2.

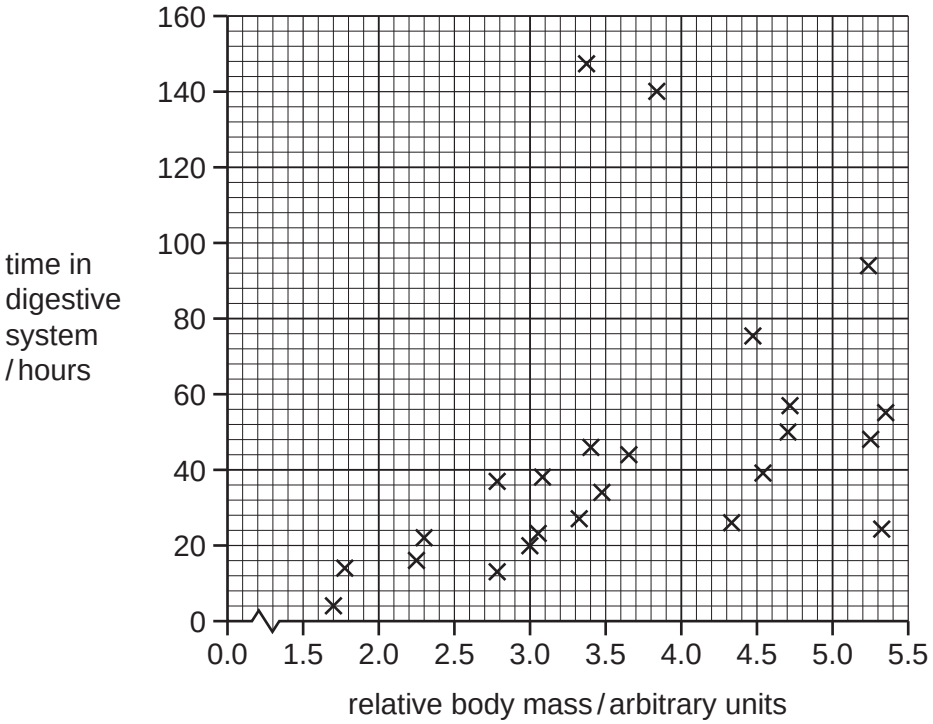


Fig. 6.2

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(c) The scientists concluded that food stays longer in the digestive systems of larger mammals compared with smaller mammals.

Discuss the evidence from Fig. 6.2 for **and** against the statement that food stays longer in the digestive systems of larger mammals.

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..... [4]

[Total: 9]

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