



Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CANDIDATE NAME				
CENTRE NUMBER		CANDIDATE NUMBER		

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.



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.

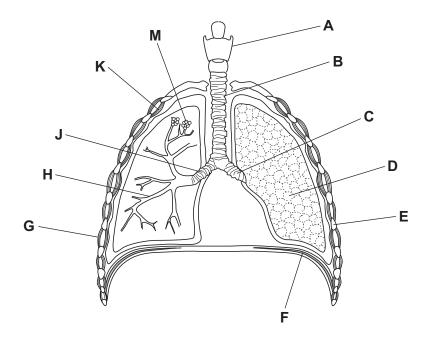


Fig. 1.1

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				

(b)	The g	as exchange system contains cartilage.	
	Descr	ibe the function of cartilage in the gas exchange system.	
			[2]
(c)	Soon	after starting physical activity the concentration of carbon dioxide in the blood increas	ses.
(-)	(i)	Name the process inside cells that produces carbon dioxide.	,00.
	(-)	Traine the process melas some that produces sarbon dischase.	
			[1]
	(ii)	State the effect on breathing of an increase in carbon dioxide concentration in the blo	od.
			[1]
	(iii)	Explain how this effect on breathing is coordinated.	
	()		
			[3]
		[Total:	13]

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

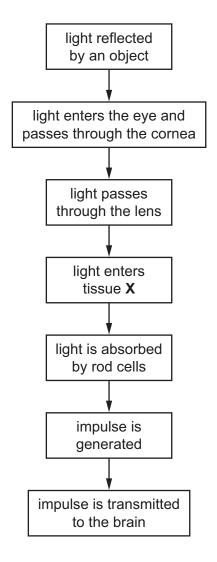


Fig. 2.1

(ii) State the name of the tissue X.

[1]

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

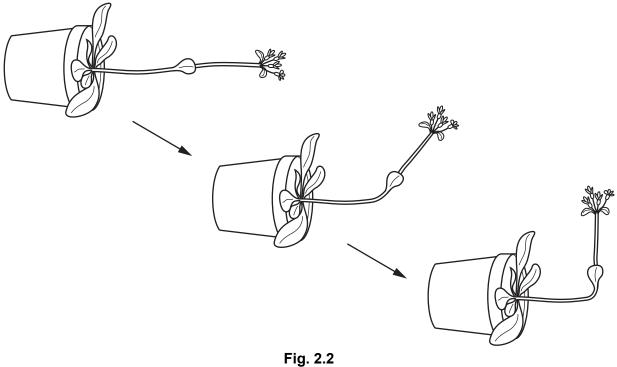
[1]

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

[1]

(iv)	Describe the role of rod cells.	
		[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.



	[1]

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

State the stimulus to which the plant responded.

[2]

(iii)	Explain the advantage to plants of the growth response shown in Fig. 2.2.	
		[2]
(iv)	Auxins control the growth responses of seedlings.	
	Explain how auxins control the growth response of <i>A. thaliana</i> , shown in Fig. 2.2.	
		[4]

[Total: 14]

BLANK PAGE

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:

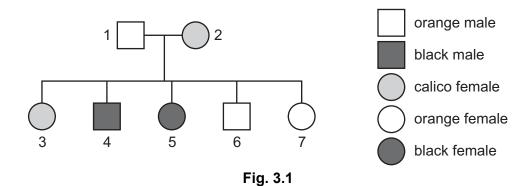
- B black
- **b** orange.

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

The X chromosome with the allele for orange is 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.



(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.	
		[3]
	[Tota	ıl: 9]

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.

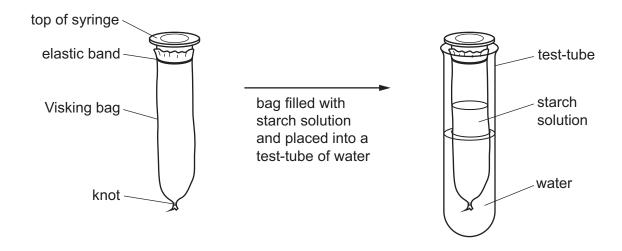


Fig. 4.1

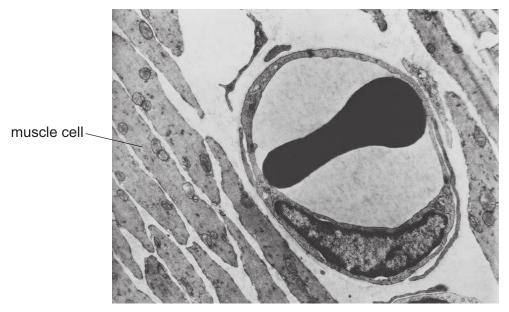
The student added some iodine solution to the water in the test-tube.

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.	
			[4]

(ii)	State three factors that influence the movement of molecules through membranes	; .
	1	
	2	
	3	
		[3]

(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.	he
	Describe the pathway taken by these molecules of carbon dioxide.	
		[3]
(ii)	Explain how capillaries are adapted for their functions.	
		[3]

(c)	Mammals have a transport system for carbon dioxide. Plants absorb carbon dioxide from t surroundings to use in photosynthesis.	heir
	Explain how a molecule of carbon dioxide from the atmosphere reaches the site of photosynthesis in a leaf.	
		[4]

[Total: 17]

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

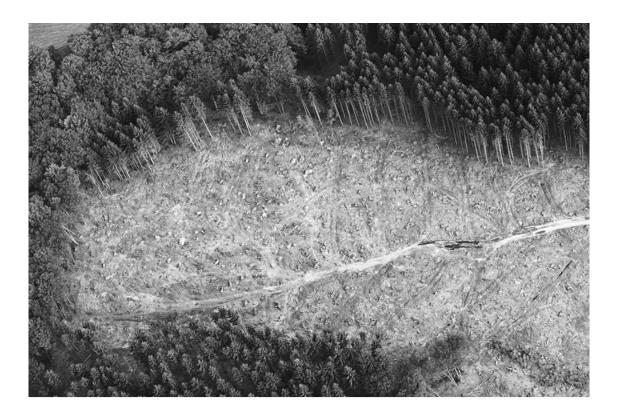


Fig. 5.1

(a)	Explain the reasons why forests may be cut down as shown in Fig. 5.1.	
		[3]

(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	19932	19317	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.

|--|

(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.	е
		[3]

(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 the natural forest.	an
		[3]
(c)	Discuss the effects of deforestation on areas of land.	
		[6]
	[Total:	: 18]

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.

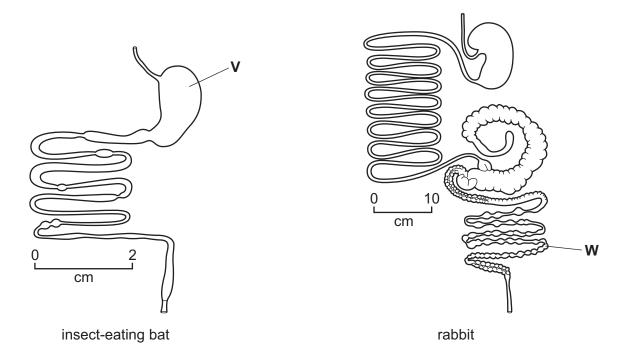


Fig. 6.1

(a)	Name the organs labelled V and W .	
	V	
	W	
		[2]
(b)	Explain the role of mechanical digestion.	
		[0]
		[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.

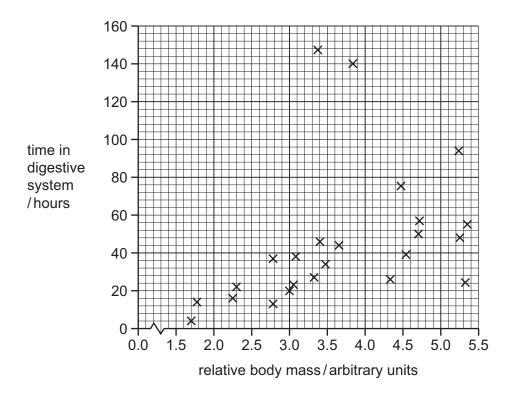


Fig. 6.2

(c)	The scientists concluded that food stays longer in the digestive systems of larger mamma compared with smaller mammals.	als
	Discuss the evidence from Fig. 6.2 for and against the statement that food stays longer in digestive systems of larger mammals.	the
		F 47
		[/]

[Total: 9]

BLANK PAGE

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.

© UCLES 2016

06_0610_43_2016_1.9