

Cambridge International Examinations

Cambridge International General Certificate of Secondary Education

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		

BIOLOGY 0610/42

Paper 4 Theory (Extended)

February/March 2017 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 15 printed pages and 1 blank page.



1 Fig. 1.1 shows a vertical section through a human heart and the major blood vessels.

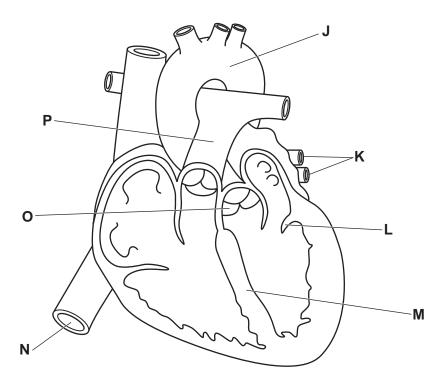


Fig. 1.1

(i)	State the names of the structures labelled L, M and O a	as shown in Fig. 1.1.	
	L		
	M		
	O		[3]
			[J]
(ii)	Identify a letter on Fig. 1.1 that represents a blood vess	el that has:	
	blood with the highest concentration of carbon dioxide		
	blood with the highest concentration of oxygen		
	the highest pressure		[0]
			[3]

(b)

(i)	Describe how blood is moved by the heart from blood vessel K to blood vessel J .
i)	Explain why the wall of the left ventricle is thicker than the wall of the right ventricle.
	[2
	[Total: 13

- 2 Bacteria are classified as belonging to the Prokaryote kingdom.
 - (a) State two features of all prokaryotes.

1	
2	
_	[2

MRSA is a type of bacterium that is resistant to antibiotics. The number of cases of MRSA identified in hospitals in the USA between 1995 and 2005 was recorded. Fig. 2.1 shows these data.

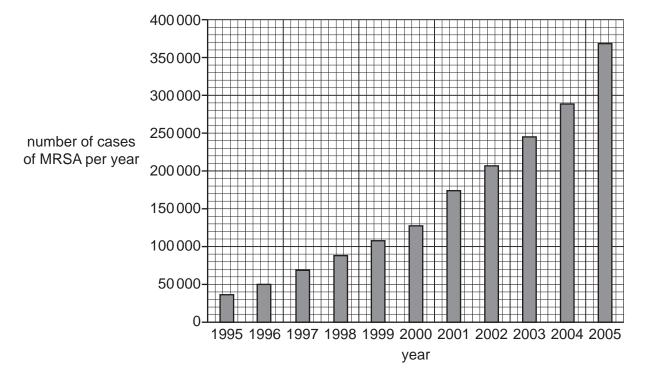


Fig. 2.1

(b)	(i)	Describe the results shown in Fig. 2.1.
		To.
	(ii)	Explain how bacteria become resistant to antibiotics.
		[4]
(c)	The	number of cases of MRSA has decreased since 2005.
	Sug	gest reasons for this decrease.
		[2]

[3]

- Colour blindness in humans is caused by a fault in some of the light receptor cells in the retina of 3 the eye. Rod cells and cone cells are two types of light receptor.
 - (a) Complete Table 3.1 to state the function of three types of cell in the eye.

Table 3.1

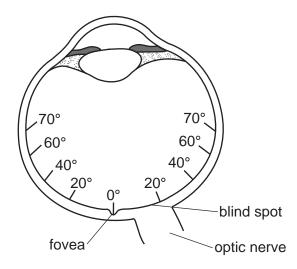
type of cell in the eye	function	
rod cells		
cone cells		
sensory neurones		
	and cone cells at places across the retina were recorded. n Fig. 3.1 shows the angles from the fovea where the recording	ngs w
made.	ows the number of rod cells and cone cells across the retina	

(b)

Use Fig. 3.1 to describe and explain the distribution of rod cells and cone cells across the

The graph in Fig. 3.1 shows the number of rod cells and cone cells across the retina.

retina.



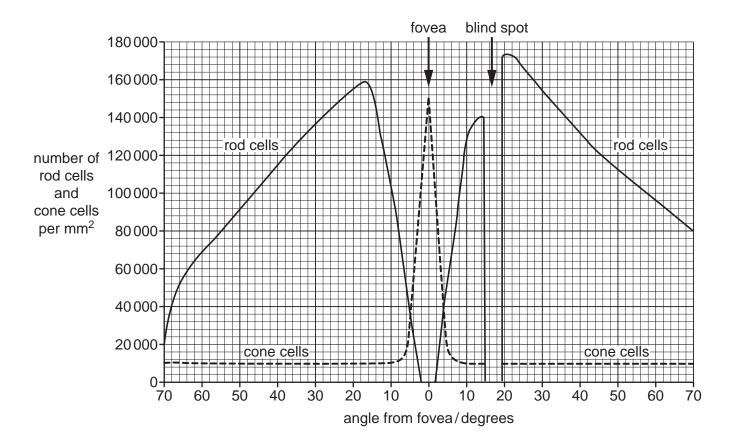


Fig. 3.1

(c) Colour blindness is a sex-linked characteristic.

The gene for colour vision is on the X chromosome.

There are two alleles of this gene:

- **B** is the allele for normal colour vision
- **b** is the allele for colour blindness.

Fig. 3.2 is a pedigree chart showing the inheritance of colour blindness in a family. The key shows the sex chromosomes and the alleles of the gene for colour vision.

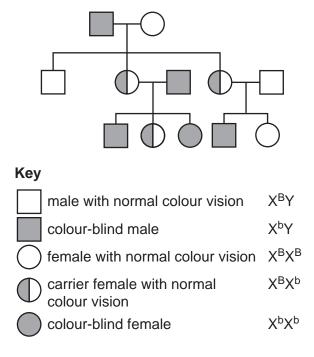


Fig. 3.2

Describe evidence from Fig. 3.2 that shows that colour billioness is a sex-linked characteristic.
[2]

(d)	A man with normal colour baby.	vision (X ^B Y) and a woman	who is colour-blind (XbXb) have a
	Complete the genetic diagr	hat the baby is colour-blind.	
	parental phenotypes	male with normal colour vision	x colour-blind female
	parental genotypes	X ^B Y	x X^bX^b
	parental gametes		

offspring genotypes						
offspring phenotypes						
probability that the baby is colour-blind:						
				[4]		

[Total: 14]

	ate two other require	ments needed b	y plants to carry	out photosynthes	sis.
1.					
2 .					
	.1 shows the numbe 2000 and 2005.	r of hectares of	forested area in	some countries in	n Africa in the ye
		Та	ble 4.1		
		hectares of fo	prest per 1000 he	ectares of land	
	country	1990	2000	2005	_
	Cameroon	25	22	21	
	Tanzania	41	37	35	=
	Nigeria	17	13	11	
	Zambia	49	45	43	-
	Zimbabwe	22	19	18	
Sh	now your working and	give your answ	er to the nearest	whole number.	
Sh	ow your working and	give your answ	er to the nearest	whole number.	
Sh	ow your working and	give your answ	er to the nearest	whole number.	
(c) Sc	ome forested areas a	re cleared to pro	 ovide land to grov	w crop plants. De	eforestation redu
(c) Sc	ome forested areas a e local rainfall and the	re cleared to pro e concentration of lain how a redu	 ovide land to grow of water vapour in	w crop plants. Den the air.	
(c) So	ome forested areas a e local rainfall and the Describe and exp	re cleared to pro e concentration of lain how a redu	 ovide land to grow of water vapour in	w crop plants. Den the air.	
(c) So	ome forested areas a e local rainfall and the Describe and exp	re cleared to pro e concentration of lain how a redument of water th	ovide land to grown of water vapour in acced concentration rough crop plants	w crop plants. Den the air.	eforestation redu
(c) So	ome forested areas a e local rainfall and the Describe and exp	re cleared to pro e concentration of lain how a redument of water th	ovide land to grown of water vapour in acced concentration rough crop plants	w crop plants. Den the air.	eforestation reduce
(c) So	ome forested areas a e local rainfall and the Describe and exp	re cleared to pro e concentration of lain how a redument of water th	ovide land to grown of water vapour in acced concentration rough crop plants	w crop plants. Den the air.	our in the air wo

	(ii)	Describe how water moves from the soil into the roots of crop plants.	
			.[3]
(d)	Des	cribe the consequences of deforestation on the animals that live in forests.	
			.[4]

			12
5	(a)	(i)	Alcohol can be made by the microorganism yeast.
			State the balanced chemical equation for the production of alcohol by yeast.
		(ii)	Name the organ that breaks down alcohol in the human body. [2]
	(b)		5.1 shows a computer model of the enzyme alcohol dehydrogenase, which is the enzyme consible for breaking down alcohol.
			Fig. 5.1
		Enz	zymes have a specific three dimensional shape.
		Exp	plain why the shape of an enzyme is important.

(c) Table 5.1 shows the enzyme activity of alcohol dehydrogenase at different temperatures.

Table 5.1

temperature/°C	enzyme activity /arbitrary units
30	115
42	175

(i)	The information in Table 5.1 shows that an increase in temperature increases the activity of alcohol dehydrogenase.	
	Explain why an increase in temperature causes an increase in enzyme activity.	
/:: \		[3]
(ii)	State one factor, other than temperature, that affects enzyme activity.	[41
(d) A g	ene is involved in the production of the enzyme alcohol dehydrogenase.	[1]
(i)	Define the term <i>gene</i> .	
		[2]
(ii)	Describe the role of ribosomes in the synthesis of proteins such as enzymes.	
		[2]

[Total: 14]

[5]

6 (a) Table 6.1 shows some of the enzymes, their substrates, products and where they are produced in the digestive system.

Complete Table 6.1.

Table 6.1

enzyme	substrate	product(s)	location of enzyme production
	starch		salivary glands
maltase	maltose		
		amino acids	stomach wall
		amino acids	pancreas and small intestinal wall
lipase	fats		

(b)	Bile is made in the liver, stored in the gall bladder and passes into the small intestine.
	Describe the role of bile in digestion.
	[3]
(c)	After chemical digestion the products of digestion are absorbed.
	Define absorption.

.....[3]

(d)	Lack of protein in the diet can result in protein-energy malnutrition.
	State the name of one disease caused by protein-energy malnutrition.
	[1]
(e)	People that eat a diet that is high in fats are often advised to reduce their intake of fats.
	Suggest the health benefits of this change in diet.
	[3]
	[Total: 15]

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