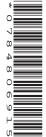


## UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS General Certificate of Education Advanced Subsidiary Level and Advanced Level

CANDIDATE NAME					
CENTRE NUMBER			CANDIDATE NUMBER		



BIOLOGY 9700/21

Paper 2 Structured Questions AS

May/June 2013

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 in the spaces provided at the top of this page. Write in dark blue or black ink.

You may use a soft pencil for any diagrams, graphs, or rough working.

Do not use red ink, staples, paper clips, highlighters, glue or correction fluid.

DO NOT WRITE IN ANY BARCODES.

Answer **all** questions.

Electronic calculators may be used.

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.

## Answer all the questions.

For Examiner's Use

- 1 Capillaries are known as exchange vessels. Substances are exchanged between blood and tissue fluid as the blood flows through the capillaries.
  - Fig. 1.1 is an electron micrograph of a section through a capillary with two red blood cells.

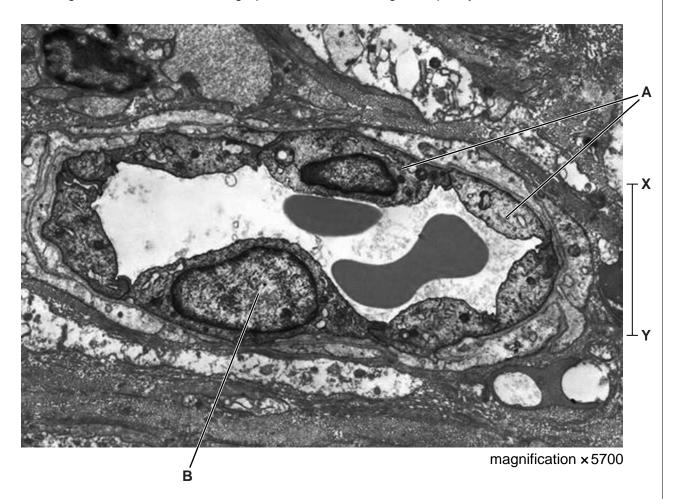


Fig. 1.1

(a) (i)	Name the cells labelled <b>A</b> and the structure labelled <b>B</b> .						
	A						
	<b>B</b> [2]						
(ii)	Calculate the actual distance <b>X</b> – <b>Y</b> on Fig. 1.1.						
	Show your working and give your answer to the nearest micrometre ( $\mu m$ ).						
	answer μm [2]						

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(iii) Explain how	capillaries are ad	apted for their function a	as exchange vessels.	
				•••••
				[2
Table 1.1 shows the	he composition o	f blood, tissue fluid and	lymph.	
		Table 1.1		
nponent	blood	tissue fluid	lymph	
blood cells lls mm <sup>-3</sup> × 10 <sup>6</sup>	5.1	0.0	0.0	
te blood cells ls mm <sup>-3</sup>	9000	75	1 000 000	
ose/gdm <sup>-3</sup>	800	800	775	
ein/gdm <sup>-3</sup>	71	1	26	
Explain the differ	ences between t	the composition of bloo	od, tissue fluid and lym	nph as
	1, for white blood	cells, glucose and prote	ein.	
white blood cells				
				•••••
glucose				
nrotein				
protein				
protein				

(c)	Outline how <b>red blood cells</b> are involved in the transport of carbon dioxide.					
		Examiner's Use				
	[3]					
	[Total: 14]					

		<b>~</b>	
2	(a)	Explain how the virus that causes measles is transmitted.	For Examiner Use
		[2]	
	(b)	Antibodies against measles are produced by plasma cells during an immune response.	
		Fig. 2.1 shows a diagram of an antibody molecule.	
		A C	
		Fig. 2.1	
		Explain the functions of the parts labelled <b>A</b> , <b>B</b> and <b>C</b> .	
		(i) A	
		[2]	
		(ii) B	
		[1]	
		(iii) C	

**3 (a)** Transpiration is often described as an 'inevitable consequence of gas exchange in plants'.

١	For
	Examiner
	1100

xplain what is meant by this statement.
[3]

The buttonwood tree, *Conocarpus erectus*, grows in coastal areas of the Americas. A study was carried out on its ability to survive on Socorro Island off the Pacific coast of Mexico. The island is exposed to high winds, which can lead to high rates of transpiration.

The transpiration rates of trees at sheltered and exposed locations at the same altitude on Socorro Island were compared. The results are shown in Fig. 3.1.

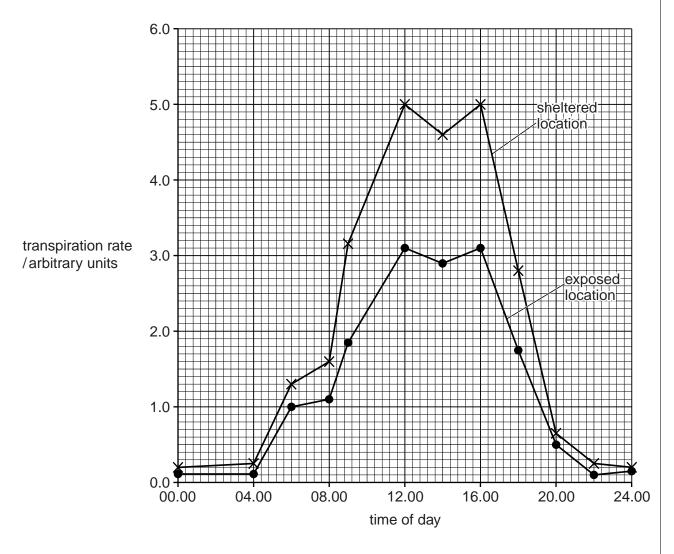


Fig. 3.1

D)	Describe the results shown in Fig. 3.1.	For
		Examine Use
	[5]	
;)	The leaves of the buttonwood trees at the exposed site were significantly smaller than those at the sheltered site.  Describe three ways, <b>other than small size</b> , in which leaves are adapted to reduce the rate of transpiration.	
	1	
	2	
	<u> </u>	
	3	
	[3]	
	[6]	

[Total: 11]

4 Fig. 4.1 shows the two base pairs in a DNA molecule.

Fig. 4.1

(a) Name the bases labelled J and K and the bond labelled L.

J	
K	
_	
L	[3]

Ĥ

K

HIV enters T-lymphocytes by a form of endocytosis. Two of the enzymes in HIV are:

- reverse transcriptase, which uses viral RNA as a template to make DNA to incorporate into the chromosomes of the host's cells
- protease, which is used to break a polypeptide into smaller molecules. These molecules are used to make the protein coat of new viral particles, which will infect other cells.

Various drugs have been developed to treat HIV infections. Table 4.1 gives information about some of these drugs.

Table 4.1

drug	enzyme inhibited	mode of action
zidovudine	reverse transcriptase	occupies active site
tenofovir	reverse transcriptase	occupies active site
efavirenz	reverse transcriptase	occupies sites other than the active site
atazanavir	protease	occupies active site

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For Examiner's Use

Explain the difference between the mode of action of zidovudine and efavirenz.	- [
	E
[4]	
People who receive drug treatment for HIV take a mixture of drugs that act in different	
vays.	
Suggest the advantage of taking a mix of the drugs shown in Table 4.1.	
Suggest the advantage of taking a fillx of the drugs shown in Table 4.1.	
[2]	
[2]	
Antibiotics are prescribed to people who have HIV/AIDS for the treatment of secondary	
nfections, but not to treat the HIV infection.	
Explain why this is so.	
[2]	
[=]	- 1

**5** Fig. 5.1 shows a section of a cell surface membrane.



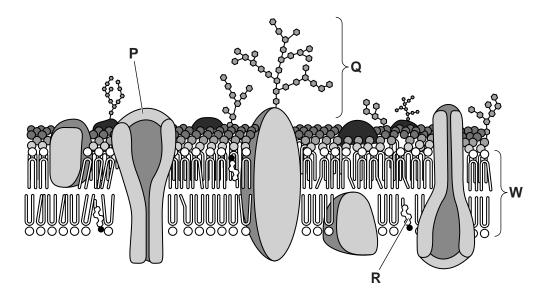


Fig. 5.1

(a)	State the fu	inctions of s	structures <b>P</b>	, <b>Q</b> and <b>R</b> .				
	Р		••••••			•••••		
	Q							
	R					• • • • • • • • • • • • • • • • • • • •		
								[3]
(b)	Circle the w	vidth of the	membrane	shown as <b>W</b>	in Fig. 5.1.			
	17.0 μm	1.7μm	0.7 μm	70.0 nm	17.0 nm	7.0 nm	0.7 nm	[1]
(c)	Membranes structure.	s, such as tl	he cell surfa	ce membran	e, are descril	oed as havir	ng a fluid mo	osaic
	Explain wha	at is meant	by the term	fluid mosaic	-			
								[2]

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movement of water across membranes. Explain why they are necessary.
[3] [Total: 9]
[Total. 9]
a) Explain how uncontrolled cell division can result in cancer.
[3
(b) Describe the experimental evidence that shows that smoking causes lung cancer.

(c) Fig. 6.1 shows the changes in mortality rates for lung cancer in five countries between 1950 and 2006 for males.

For Examiner's Use

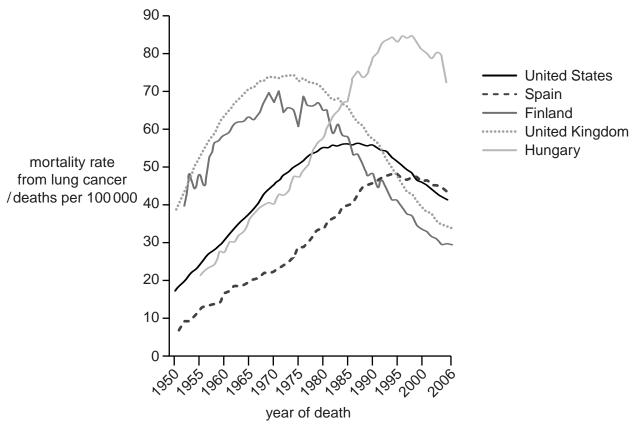


Fig. 6.1

With reference to Fig. 6.1, describe the similarities and differences in the trends in

mortality rates in the countries shown.
[3] [Total: 9]

Copyright Acknowledgements:

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