

Surname	Centre Number	Candidate Number
Other Names		2



GCE AS/A level

1072/02

HUMAN BIOLOGY – HB2

A.M. MONDAY, 3 June 2013

1½ hours

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	5	
2.	6	
3.	9	
4.	10	
5.	11	
6.	9	
7.	10	
8.	10	
Total	70	

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INSTRUCTIONS TO CANDIDATES

Use black ink or black ball-point pen.

Write your name, centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided in this booklet.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets at the end of each question or part-question.

You are reminded of the necessity for good English and orderly presentation in your answers.

The quality of written communication will affect the awarding of marks.

1. Complete the following sentences giving the correct name.

(a) A disease which is always present at low levels in an area is referred to as [1]

.....

(b) A person who shows no symptoms when infected by a disease but can still pass the disease on to another individual, is referred to as a [1]

.....

(c) Organisms which carry pathogens from one individual to another are called [1]

.....

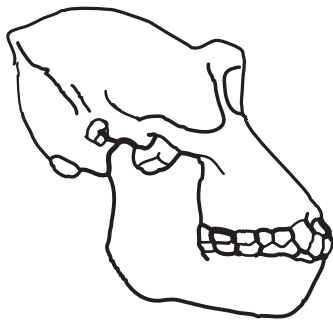
(d) Antibiotics that prevent bacterial growth are referred to as [1]

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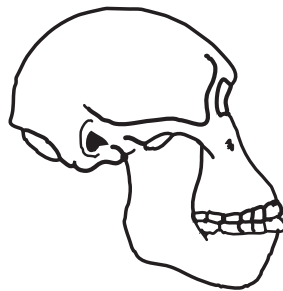
(e) The term used to describe a disease which may be passed or transmitted from one individual to another is [1]

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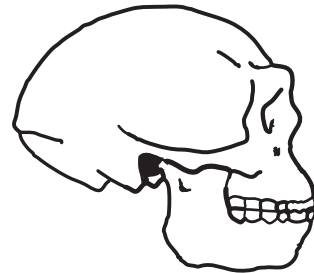
2. The diagram below shows skulls from three different primates. *Australopithecus afarensis* and *Homo erectus* have been extinct for over a million years.



Gorilla gorilla



Australopithecus afarensis



Homo erectus

(a) Name the **class** to which **all** these primates belong. [1]

.....

(b) Define the term *species*. [2]

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- (c) (i) With reference to the diagrams opposite suggest why scientists regard *Homo erectus* as being more closely related to *Australopithecus afarensis* than *Gorilla gorilla*. [1]

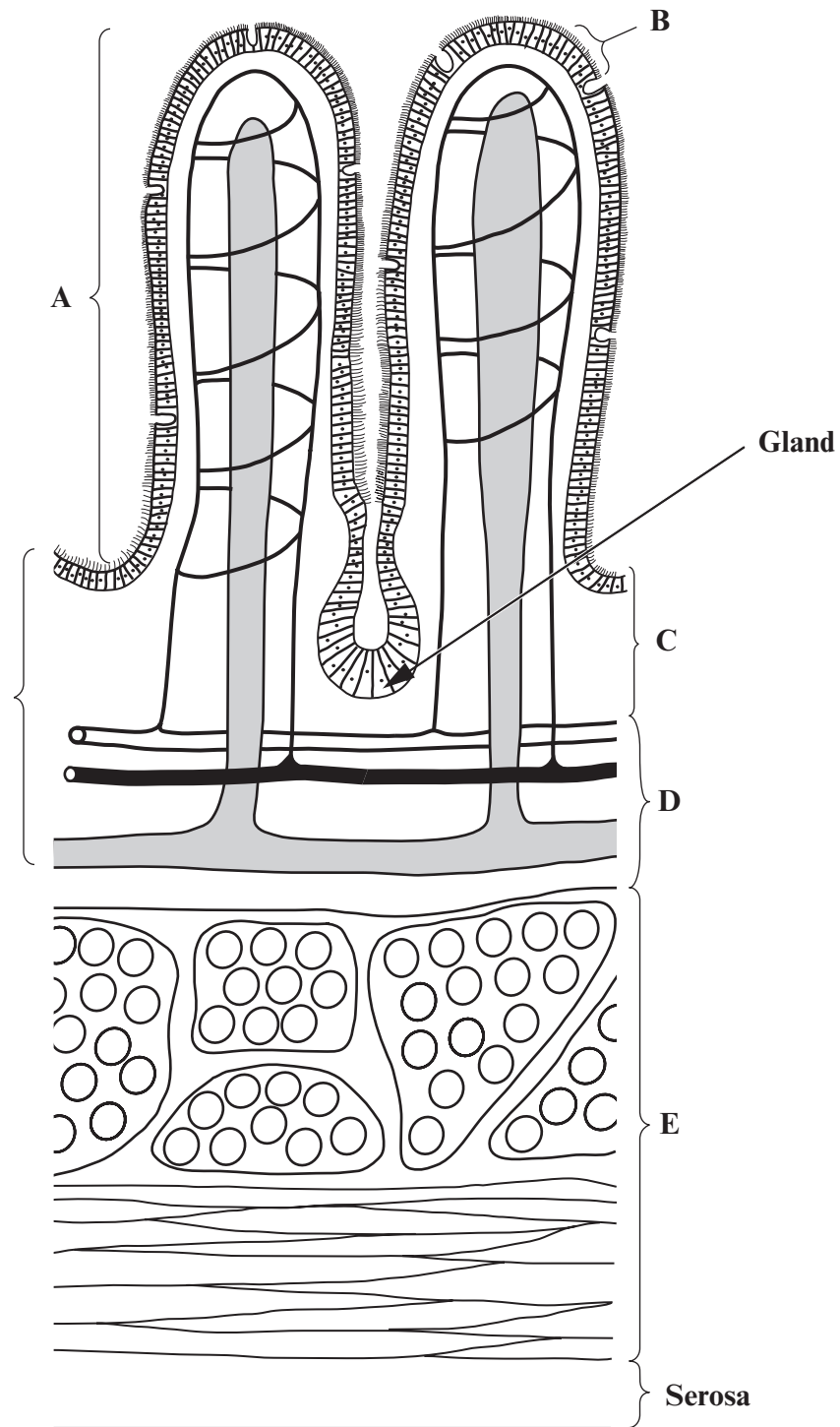
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- (ii) Using their classification, identify which primate is most closely related to modern humans, and explain your answer. [2]

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3. (a) The diagram shows a longitudinal section through a part of the alimentary canal.



- (i) Name the part of the alimentary canal where structures A would be found. [1]

- (ii) Name the blood vessel that transports amino acids to the liver. [1]

(iii) Use the diagram opposite to complete the following table.

[4]

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Letter	Name	Function
B		increases surface area
C		contains glands that release secretions
D		contains vessels to transport products of digestion
E	muscle layer	

(b) Coeliac disease is a disease that affects the small intestine.
Suggest why symptoms often include diarrhoea and fatigue.

[3]

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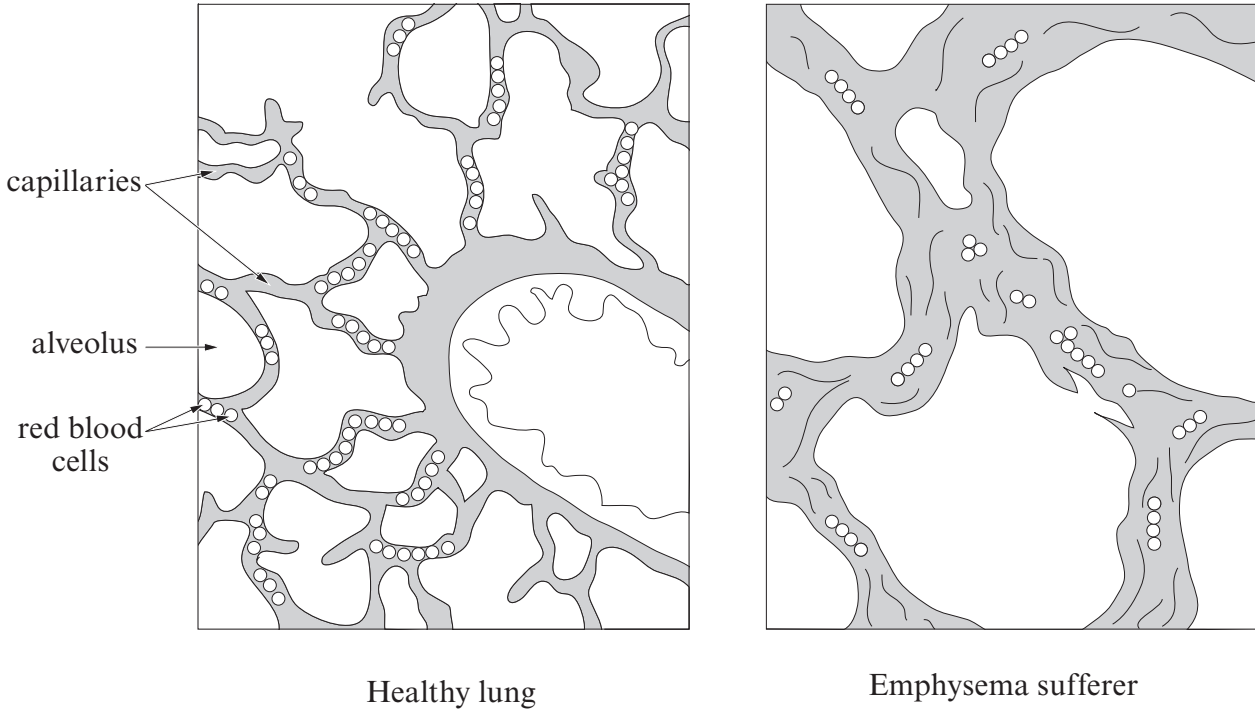
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4. The diagrams below show a section through a healthy lung and a section through a lung from a patient suffering from emphysema. Both diagrams are drawn to the same scale.



- (a) List **three** adaptations for gas exchange **shown** in the healthy lung diagram above. [3]

- (i)
- (ii)
- (iii)

- (b) Describe how **one** of the adaptations listed in part (a) aids gas exchange. [1]

Adaptation

Description

.....

(c) Explain why sufferers of emphysema are often short of breath when performing light exercise. [4]

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(d) Explain why babies born more than 17 weeks prematurely, frequently suffer from respiratory failure. [2]

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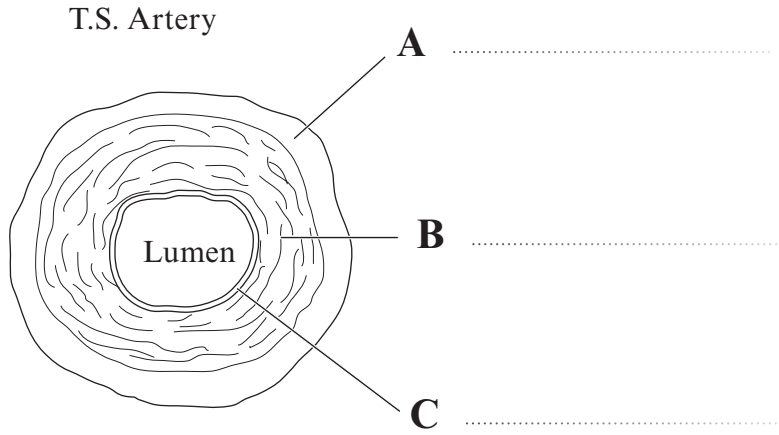
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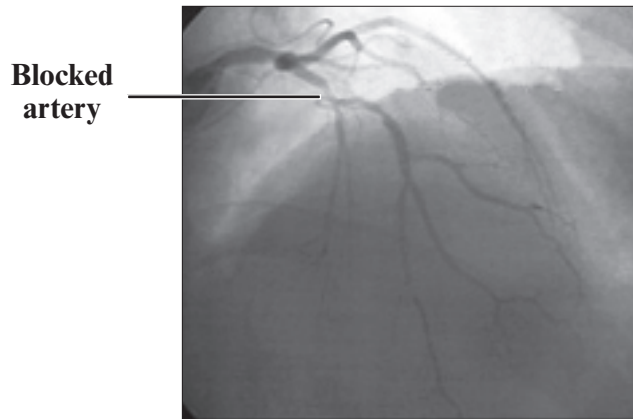
5. The diagram below shows a transverse section through an artery.

(a) Complete the labels shown on the diagram below.

[2]



(b) The x-ray photograph below shows a blocked coronary artery in a patient suffering from ischaemic heart disease as a result of a high cholesterol diet.



(i) Explain how this artery has become blocked.

[2]

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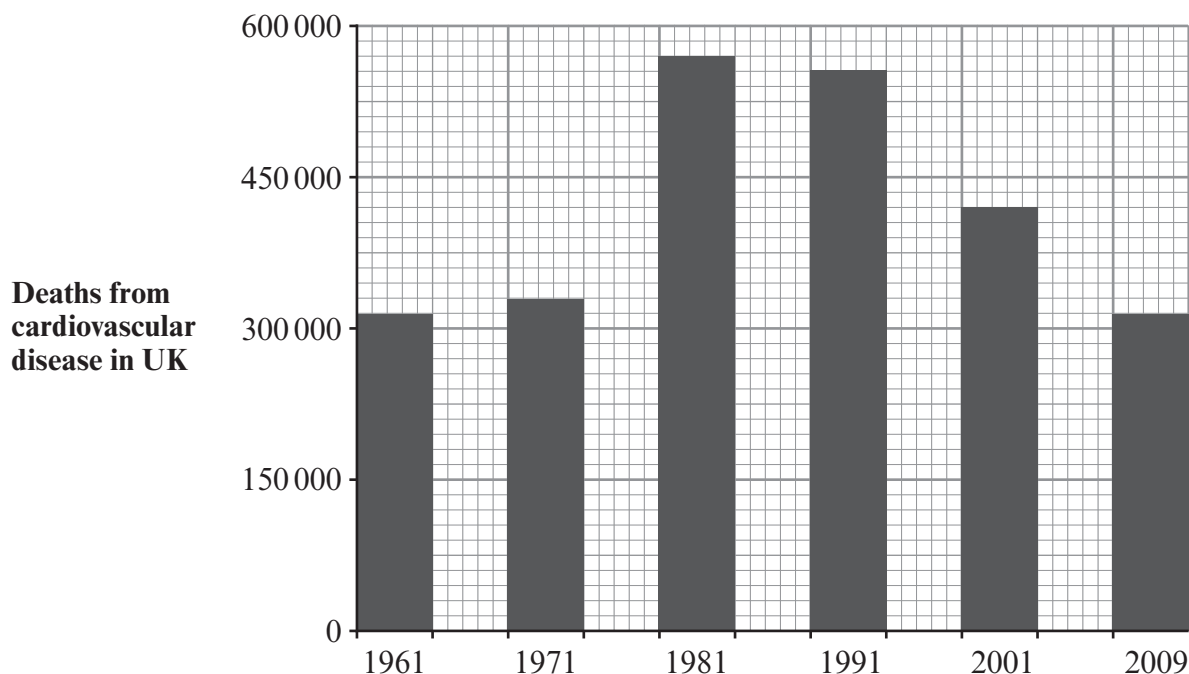
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(ii) Suggest *another* lifestyle choice which can increase the risk of ischaemic heart disease.

[1]

.....

- (c) The graph below shows deaths from cardiovascular disease in the UK over the past half century.



*Scarborough et al. 2011, British Heart Foundation Health Promotion Research Group
Department of Public Health, University of Oxford.*

- (i) Using the information provided above, describe how the number of deaths from cardiovascular disease has changed in the years between 1961 and 2009. [3]

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- (ii) Suggest reasons for the changes seen between 1981-2009. [3]

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6. Cholera is an infection of the gut lining caused by the bacterium *Vibrio cholerae*. The bacteria releases toxins that cause watery diarrhoea leading to severe dehydration and frequently death. Transmission occurs primarily by drinking water or eating food that has been contaminated by the faeces of an infected person. In the ten months following the earthquake in Haiti in 2010, over 60,000 cases of cholera were reported, concluding in 1400 deaths.

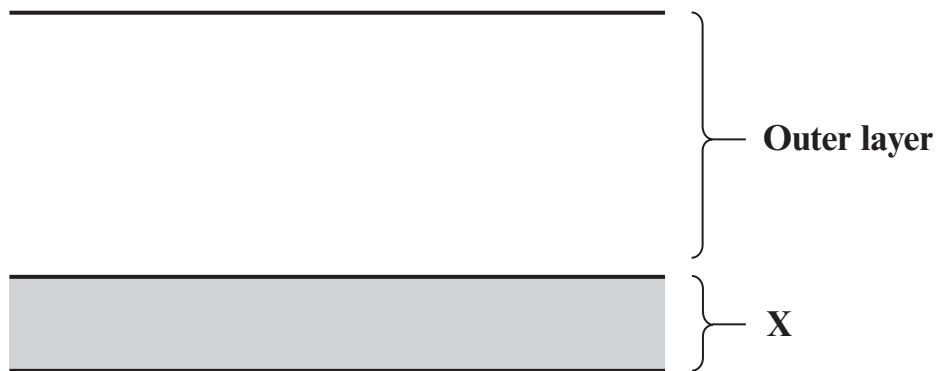
(a) Describe how the spread of cholera could have been **prevented** following the earthquake. [2]

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(b) The diagram below shows part of the cell wall taken from *Vibrio cholerae*.



(i) Name **two** components found in the outer layer. [2]

.....

.....

(ii) Name the component found in layer X. [1]

.....

(iii) What colour would you expect this bacterium to be following the gram stain test? [1]

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(iv) Explain why penicillin is ineffective in treating cholera.

[3]

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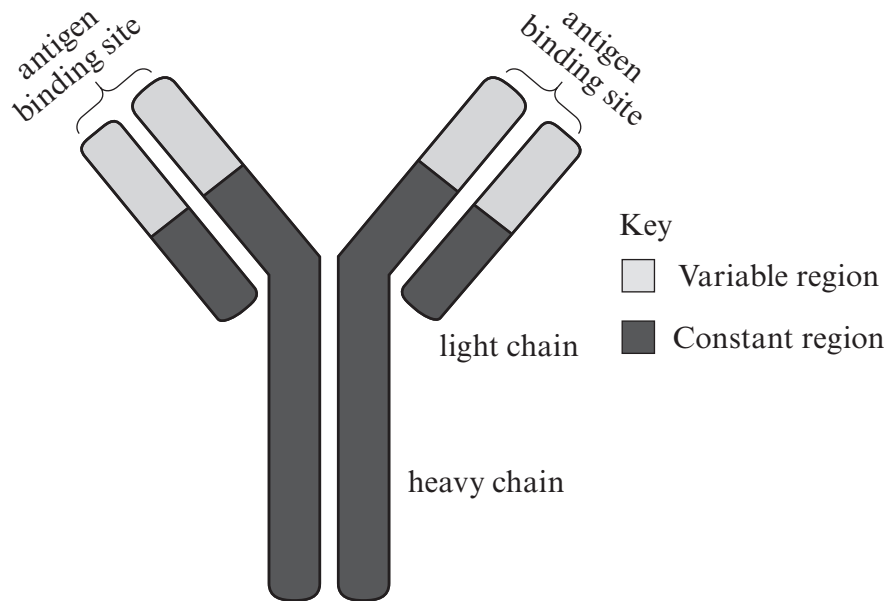
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7. Read the following passage and answer the questions.

- 1 Antibodies are produced in response to foreign antigens and are Y-shaped in appearance. The amino acid sequence in the variable region varies greatly between different antibodies. This variable region, composed of 110-130 amino acids, gives the antibody its specificity for binding to an antigen. Vaccinations are widely used to give protection against a range of diseases by triggering antibody production in the recipient.
- 5 Antibody responses to influenza vaccine in HIV-infected persons tend to be impaired, with more severe impairment in later stages of HIV infection.

A model to show antibody structure



(a) State the **total** number of polypeptide chains which make up the structure of an antibody. [1]

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(b) Explain what is meant by 'specificity for binding to an antigen' in lines 3-4. [1]

.....

(c) Name the immunological response that produces antibodies. [1]

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(d) Explain why a patient with AIDS would be unable to produce sufficient antibodies to give protection against influenza. [3]

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(e) Explain **two** differences between active and passive immunity. [4]

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