

GCE
AS and A Level

Human Biology

AS exams 2009 onwards
A2 exams 2010 onwards

Unit 2: **Specimen question paper**

Version 1.0



Surname					Other Names				
Centre Number					Candidate Number				
Candidate Signature									

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General Certificate of Education
Advanced Subsidiary Examination



HUMAN BIOLOGY

Why people are like they are

HBIO2

Specimen Paper

In addition to this paper you will require

- a ruler with millimetre measurements

You may use a calculator

Time allowed: 1 hour 30 minutes

Instructions

- Use a black ink or ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- Answer the questions in the spaces provided.
- Do all rough work in this book. Cross through any work you do not want to be marked.
- If you need additional space, you should continue your answers at the end of this book, indicating clearly which question you are answering.

Information

- The maximum mark for this paper is 80.
- The marks for questions are shown in brackets.
- You are reminded of the need for good English and clear presentation in your answers.
- Use accurate scientific terminology in all answers.

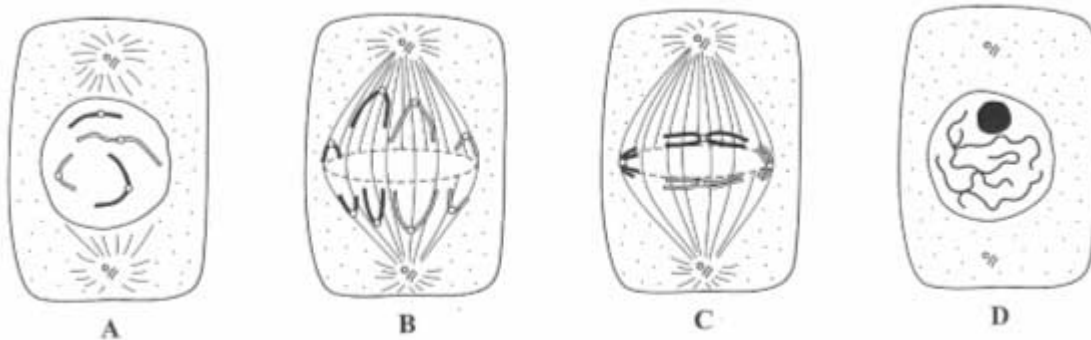
For Examiner's Use			
Number	Mark	Number	Mark
1		8	
2		9	
3		10	
4		11	
5		12	
6		13	
7			
Total (Column 1)			
Total (Column 2)			
Quality of Written Communication			
TOTAL			
Examiner's Initials			

Answer **all** questions in the space provided.

- 1 (a) In which phase of the cell cycle does DNA replication take place?

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(1 mark)

- (b) The diagrams show some of the stages of mitosis. Arrange the letters **A** to **D** to give the correct sequence of stages, starting with stage **D**.



Sequence:

D

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(1 mark)

- (c) Describe the role of the spindle in mitosis.

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(2 marks)

- 2 *Toxocara* is a parasite that can infect both domestic animals and humans. The poster below is displayed in parks and open spaces in some parts of the country.

BAG IT & BIN IT !



**Clean up after your dog
or face a £500 fine**

- (a) The poster was produced to try and reduce the risk of humans becoming infected with *Toxocara*. Explain how.

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(3 marks)

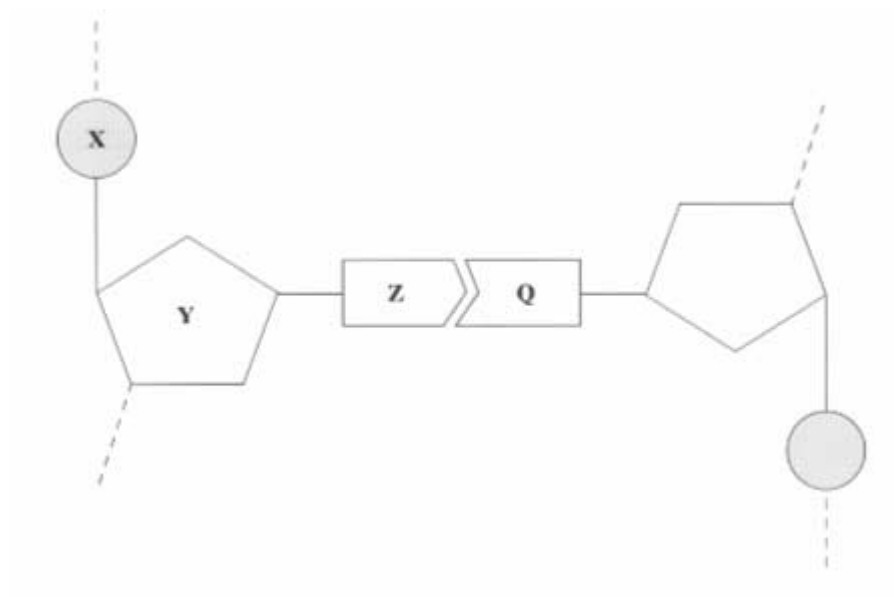
- (b) There is a high infection rate in very young children. Suggest why.

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(1 mark)

3 The diagram shows part of a DNA molecule.



(a) Name the parts labelled **X**, **Y** and **Z**

X.....

Y.....

Z.....

(3 marks)

(b) What type of bond holds **Z** and **Q** together?

.....
(1 mark)

(c) A sample of DNA was analysed. 28% of the nucleotides contained thymine. Calculate the percentage of nucleotides which contained cytosine. Show your working.

Answer % (2 marks)

- 4 (a) Give **one** similarity and **one** difference in the structure of DNA and RNA.

Similarity.....

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Difference.....

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(2 marks)

- (b) Describe DNA replication.

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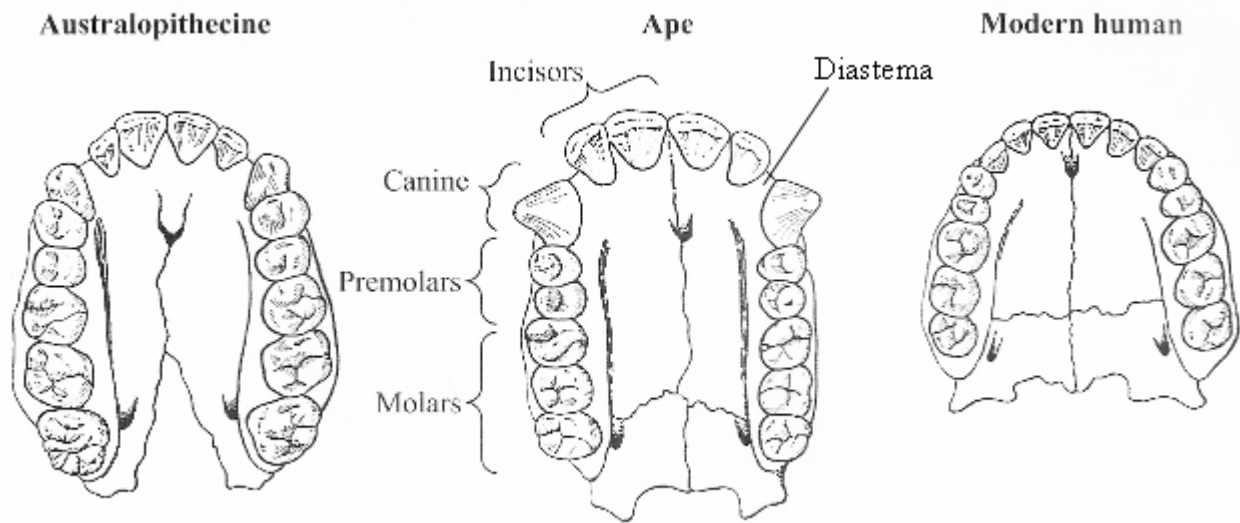
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(4 marks)

Turn over for the next question

- 5 The drawings show the upper jaws of an australopithecine, an ape and a modern human. All drawings are to the same scale.



(a) Describe **one** way in which the teeth of the australopithecine are

(i) different from an ape

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(1 mark)

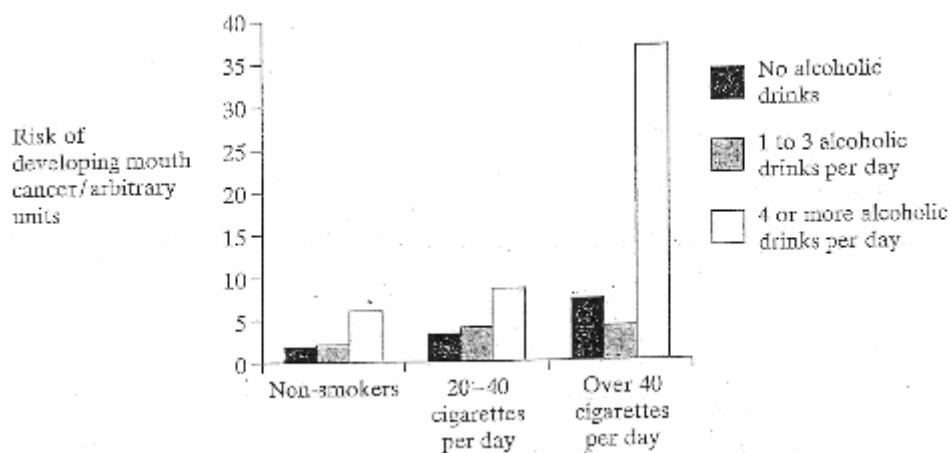
(ii) different from a modern human.

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(1 mark)

(b) It has been suggested that this australopithecine ate large amounts of tough plant material. Its teeth were adapted so that it could grind plant food effectively. Explain how.

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(2 marks)

- 6 The bar chart shows the effects of smoking and drinking alcoholic drinks on the risk of developing mouth cancer.



- (a) Use the bar chart to describe how smoking and drinking alcohol affect the risk of developing mouth cancer.

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(4 marks)

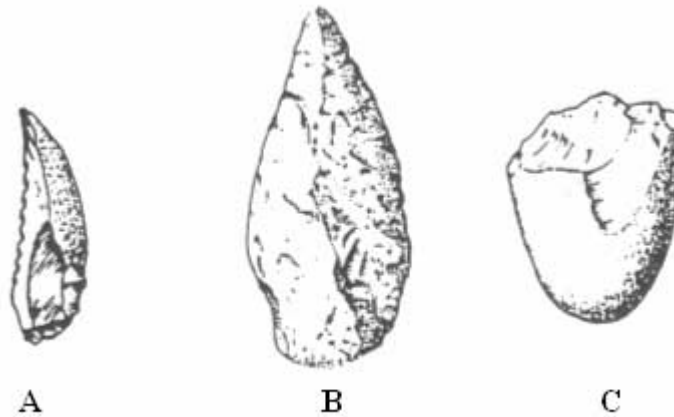
- (b) People who do not smoke or drink sometimes develop mouth cancer. Suggest why.

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(1 mark)

7 The diagrams A – D show stone tools found with the fossil remains of some early humans.

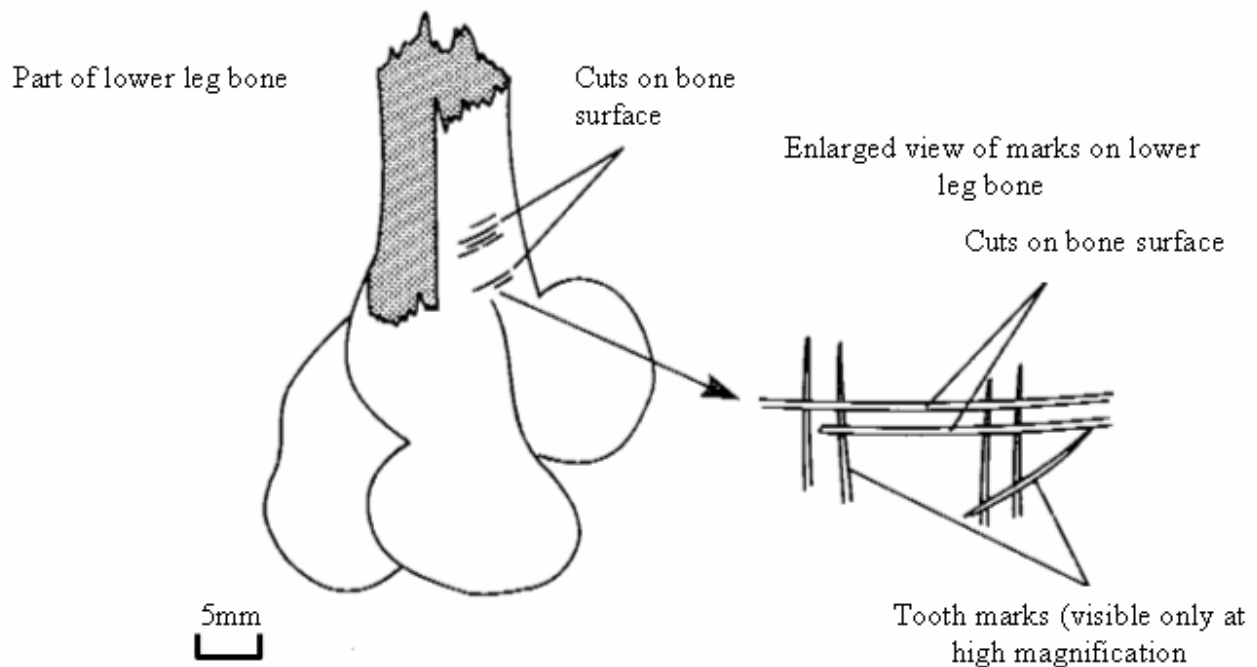


- (a) Write the letters A – C in the order these tools appeared in evolutionary sequence. Start with the oldest.

Sequence:

(1 mark)

- (b) The drawings show part of a lower leg bone of a herbivore found at an archaeological site and an enlarged view of the marks found on this bone.



- (i) Suggest **one** use of simple tools made by the people who lived at this site.

Give evidence from the drawings to support your answer.

Use

Evidence

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(2 marks)

- (ii) These humans scavenged the remains of animals killed and partially eaten by carnivores. Explain the evidence from the drawings that support this statement.

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(2 marks)

- 8 The table below refers to cultural developments during the evolution of humans.

Three species of *Homo* are listed in the table. Complete the table by placing a tick in the appropriate box if the statement is correct and a cross if it is incorrect.

Statement	<i>Homo habilis</i>	<i>Homo ergaster</i>	<i>Homo sapiens</i>
First use of fire			
First use of pebble tools (Oldowan culture)			
First use of hand axes (Acheulian culture)			
First tools made by striking flakes from a core			
First production of cave art			

(5 marks)

- 9 Early humans are thought to have had dark skins. They are thought to have evolved in tropical Africa and then spread out into the rest of the world. Natural selection then produced a range of skin pigmentation in different human populations.

- (a) Explain the advantage of pale skin in humans living in Northern Europe.

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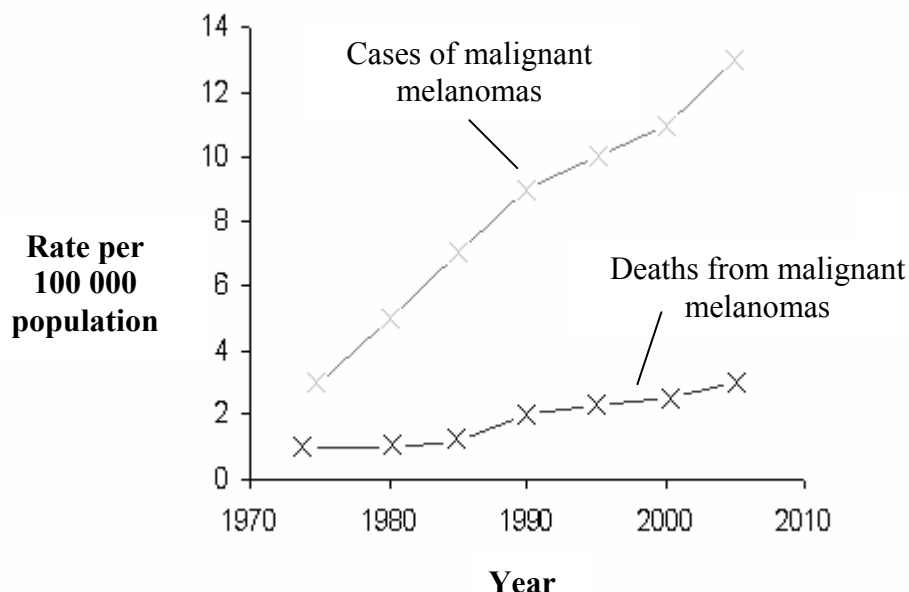
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(2 marks)

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- (b) The graph shows the number of cases of malignant melanoma and the number of deaths from this cancer between 1975 and 2005.



- (i) There has been a small increase in mortality although incidence has increased a lot. Suggest why.

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(2 marks)

- (ii) A tumour is a mass of cells which may have an inadequate blood supply. A drug is being developed which only kills cells if they do not have enough oxygen. Suggest how this drug might be helpful in the treatment of cancer.

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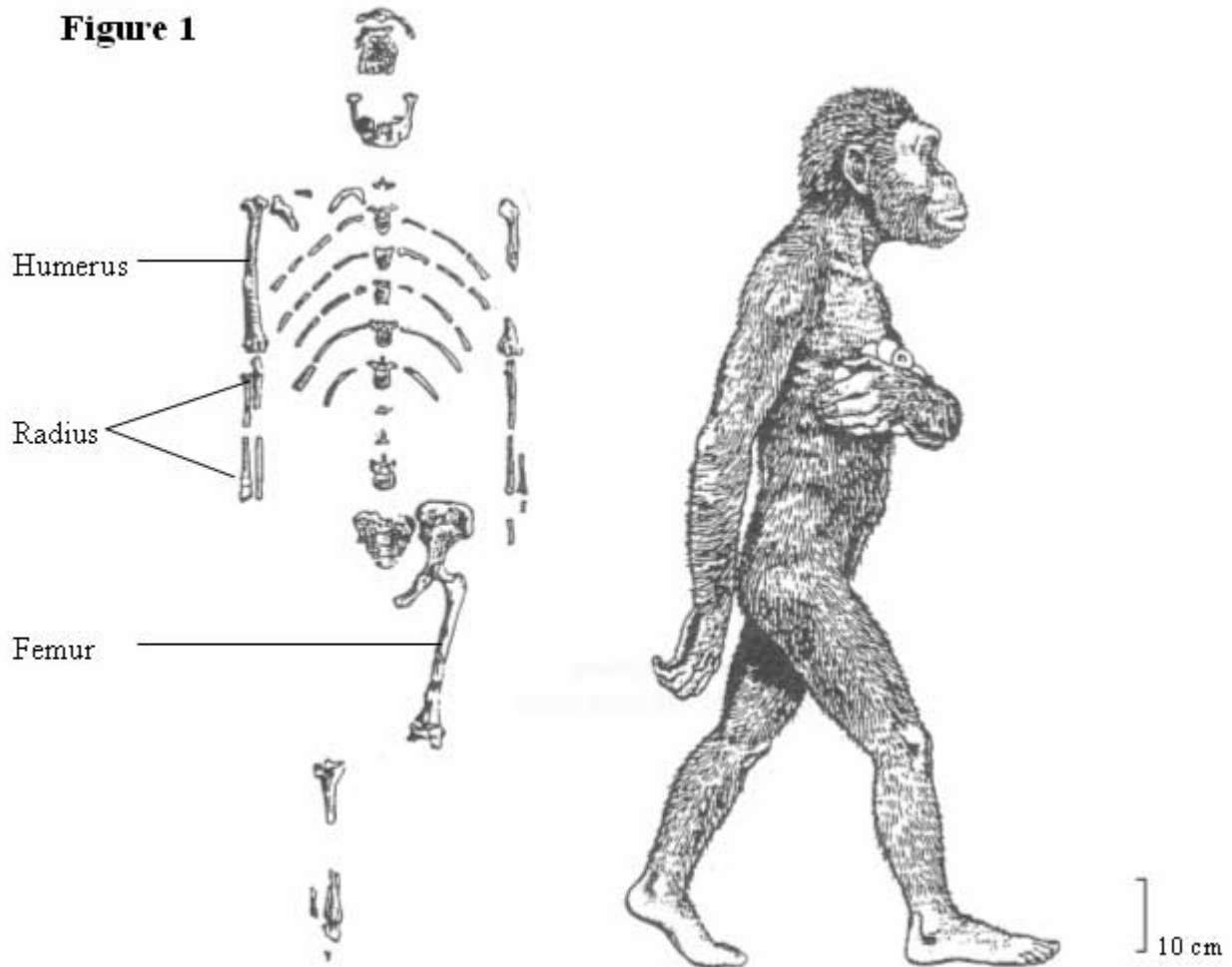
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(2 marks)

- 10 **Figure 1** is a drawing of part of a skeleton of *Australopithecus afarensis*. It also shows an artist's impression of this individual.

Figure 1



(Reproduced from: *The Origins of Mankind*, Stephen Tomkins, by permission of Cambridge University Press.)

- (a) Explain **two** features shown in the skeleton that have been used to create the artist's impression.

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(2 marks)

- (b) The table contains information about the relative lengths of arm and leg bones in chimpanzees, two *Australopithecines* and modern man.

Species	Brachial index; length of radius as percentage of length of humerus	Humerofemoral index: length of humerus as percentage of femur
<i>Pan paniscus</i> (chimpanzee)	91.9	97.8
<i>Australopithecus</i> <i>afarensis</i>	90.7	
<i>Australopithecus garhi</i>	97.9	approximately 70
<i>Homo sapiens</i> (modern man)	79.6	73.3

- (i) Use the drawing of the skeleton in Figure 1 to complete the table.

(1 mark)

- (ii) The humerofemoral index of *Australopithecus garhi* is approximately 70. Suggest why this figure is only approximate.

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(1 mark)

- (iii) Suggest why the humerofemoral index is calculated.

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(1 mark)

- (c) Give one method by which it would be possible to determine how long ago *Australopithecus afarensis* lived.

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(1 marks)

- 11** (a) Between 8000 and 12 000 years ago humans began the cultivation of wheat and the domestication of cattle.

Explain how the cultivation of plants and the domestication of animals influenced the development of human societies.

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(4 marks)

- (b) Early farmers cultivated barley. They selected plants with a strong stalk holding the grains on the plants. The drawing shows the grain on a typical barley plant.



- (i) Suggest **one** advantage to the early farmers of a stalk that did not break easily.

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(1 mark)

- (ii) What might the early farmers have done to lead to the development of barley with stronger stalks?

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(2 marks)

- 12** (a) The medulla in the brain, and the stretch receptors in the lungs, maintain a constant rate of breathing in a person who is at rest. Describe how.

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(6 marks)

- (b) Scientists investigated the effect of carbon dioxide concentration on lung ventilation. The table shows the results.

	Concentration of carbon dioxide breathed in / %					
	0.04	0.80	1.50	3.00	5.50	6.00
Mean volume of one breath / cm³	670	740	800	1250	1850	2100
Mean number of breaths per minute	14	14	15	15	16	27

- (i) Describe the effect of increasing carbon dioxide concentration on the rate of breathing.

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(2 marks)

- (ii) The concentration of carbon dioxide was increased from 0.04 to 6.0 %.

Calculate the percentage increase in the total volume of air breathed in per minute that this produced. Show your working.

Answer % (2 marks)

- 13 Domestication is a process by which animals become adapted to humans by genetic changes. The dog was domesticated from wolves. In becoming domesticated, the adult dog has kept many features of the young wolf. Their skulls are broad in length and behavioural traits like barking are retained. Behavioural changes involve several characteristics which make the animal docile and willing. These changes appear to be inherited.

- 10 Scientists tried to domesticate the silver fox, *Vulpes vulpes*. Like the wolf they are in the family canidae. Scientists chose male foxes and vixen from a commercial fur farm and bred from them for tameness. Tameness was measured by the ability of young, sexually mature foxes to behave in a friendly manner to their handlers. After ten generations, 18% of the young foxes were tame. By the 1990s, 75% of the population were tame. Breeding for tameness was associated with physical changes such as floppy ears, which is a juvenile characteristic of newborn wolves. Skull size has also changed to a more juvenile condition.

- 15 So far, no one has been able to replicate these results.

Use information in the passage and your own knowledge to answer the following questions.

- (a) Complete the table to show the classification of the fox.

Kingdom		Class		Family		
	Chordata	Mammalia	Carnivora			

(2 marks)

- (b) What features of domestication are displayed by tame foxes?

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(2 marks)

- (c) (i) The scientists produced largely tame foxes. Explain how.

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(4 marks)

- (ii) Do you think that the results of this experiment are reliable? Explain your answer.

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(4 marks)

END OF QUESTIONS

There are no questions printed on this page