

Surname	Centre Number	Candidate Number
Other Names		0



**GCSE**

4461/01

**SCIENCE A/BIOLOGY**

**BIOLOGY 1  
FOUNDATION TIER**

A.M. WEDNESDAY, 8 January 2014

1 hour

**Suitable for Modified Language Candidates**

For Examiner's use only		
Question	Maximum Mark	Mark Awarded
1.	11	
2.	6	
3.	2	
4.	8	
5.	9	
6.	5	
7.	6	
8.	6	
9.	7	
<b>Total</b>	<b>60</b>	

**ADDITIONAL MATERIALS**

In addition to this paper you may require a calculator and a ruler.

**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 that assessment will take into account the quality of written communication used in your answer to question 9.

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Answer all questions.

1. A population of sheep lives on the Scottish island of St. Kilda.  
The photograph below shows a sheep.



© soyaandboreraysheep.com

- (a) Sheep are vertebrate animals.  
State **one** feature common to all vertebrate animals. [1]

- (b) The scientific name for sheep is *Ovis aries*. Underline the correct word to complete sentences (i) and (ii) below.

In the name *Ovis aries*:

- (i) *Ovis* is the **order** / **family** / **genus** / **species** [1]
- (ii) *aries* is the **order** / **family** / **genus** / **species** [1]
- (c) Sheep are herbivores.  
What does the term *herbivore* mean? [1]

- (d) The sheep on the island are either pale or dark in colour.

The table below gives the percentage (%) of dark sheep on St. Kilda between 1985 and 2005.

Year	Percentage (%) of dark sheep
1985	76
1990	74
1995	71
2000	70
2005	69

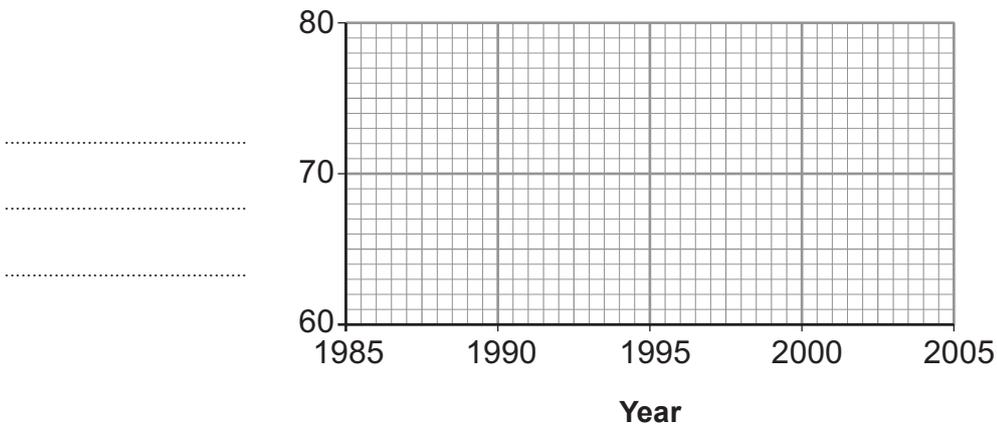
- (i) Using the data above, plot a line graph on the grid below by:

- I. Labelling the vertical axis.
- II. Plotting the points.
- III. Joining the points with a ruler.

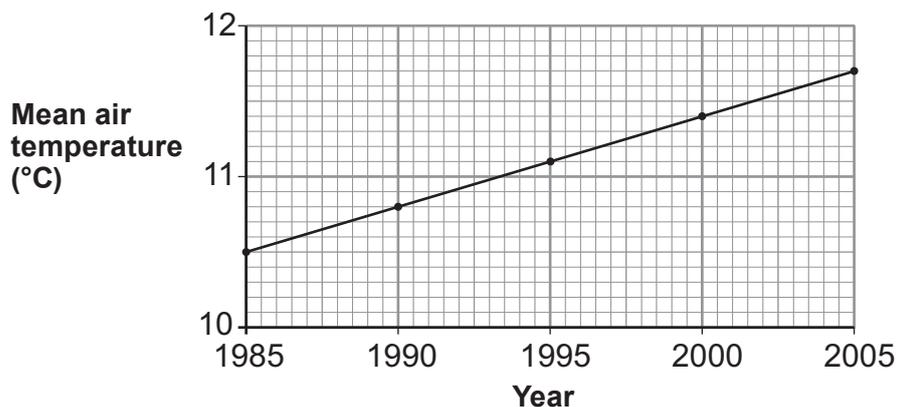
[1]

[2]

[1]



- (ii) The graph below shows the mean air temperature on the island over the same period (time).



Some scientists think that the change in the percentage of dark sheep on the island is because of a change in the mean air temperature.

- I. Describe the evidence that supports the scientists' opinion. Use **both** of the graphs opposite for your answer. [1]

.....

.....

.....

- II. It is not possible to be sure that the change in the percentage of dark sheep on the island is because of the change in the mean air temperature.

State **two other** factors that could cause the change in the percentage of dark sheep. [2]

.....

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11

2. The photograph below shows a badger.



© Clinton Moffat / Shutterstock

- It is thought that badgers spread the disease bovine TB to cattle.
- Badger culls (killing badgers) aimed at reducing bovine TB in cattle were planned for August 2012.
- In certain areas, badgers were to be shot.
- The cull would have tried to kill all the badgers in each area.
- However, some scientists thought that a badger cull might actually spread bovine TB to cattle on other farms.

Use the above information, and your own knowledge, to answer the following questions.

(a) Describe the possible link between badgers and bovine TB in cattle. [1]

.....  
.....

(b) The exact areas for the culls were kept secret. Suggest why. [1]

.....  
.....

(c) A successful cull would kill **all** the badgers on one farm. However, even if successful, a second cull would be needed after a few years. Why would a second cull be necessary? [1]

.....  
.....

(d) Suggest **one** reason why some scientists think a badger cull might spread bovine TB to cattle on *other* farms. [1]

.....  
.....

(e) Suggest **two other** ways (apart from killing badgers) which would prevent the spread of bovine TB. [2]

1. ....

2. ....

3. During the London Olympic Games of 2012, a government minister called for schools to promote a healthy diet. Also to provide more sport to reduce the number of obese (overweight) teenagers in the UK.

“Teenagers need a healthy diet which balances fat intake with activity levels,” he said.

(a) Give **one** health problem that may result from being obese. [1]

.....

(b) Give a reason why increased activity might help to reduce the number of obese teenagers. [1]

.....

.....

2

4. This question is about the disease cystic fibrosis.

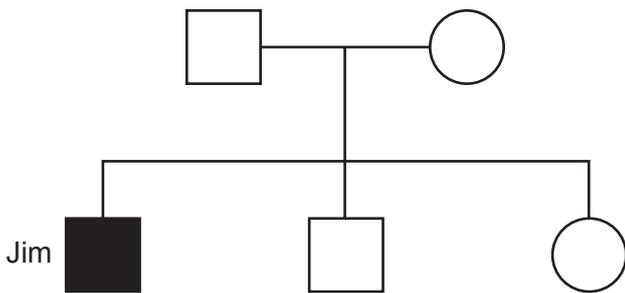
(a) Complete the following sentences by underlining the correct word or words for each.

(i) Cystic fibrosis affects [1]  
 blood vessels  
 bronchioles  
 nerves

(ii) One symptom of cystic fibrosis is [1]  
 increased body temperature  
 production of thick mucus  
 raised blood pressure

(iii) Gene therapy for cystic fibrosis uses [1]  
 an inhaler  
 an injection  
 a powder taken in a drink

(b) Look at the family tree below.



Key:

- Male without cystic fibrosis
- Female without cystic fibrosis
- Male with cystic fibrosis

Choose the correct letter to complete the following statements. Use information in the family tree above and your own knowledge.

(i) Jim inherited cystic fibrosis: [1]  
**A** **only** from his father  
**B** **only** from his mother  
**C** from his father **and** his mother

.....

(ii) Jim's parents are: [1]  
**A** heterozygous for cystic fibrosis  
**B** homozygous dominant for cystic fibrosis  
**C** homozygous recessive for cystic fibrosis

.....

(iii) Jim is: [1]

- A heterozygous for cystic fibrosis
  - B homozygous dominant for cystic fibrosis
  - C homozygous recessive for cystic fibrosis
- .....

(iv) Jim's parents are expecting another child. The probability that the child will have cystic fibrosis is: [1]

- A 25%
  - B 50%
  - C 75%
- .....

(v) In the human population, cystic fibrosis affects: [1]

- A **only** males
  - B **only** females
  - C males **and** females
- .....

5. Tracy investigated decay using two leaves of the same size. The leaves were from the same tree.
- She made a drawing of each leaf.
  - She then buried each leaf in a separate beaker. The beakers contained equal volumes of soil.
  - She kept one beaker at 5°C and one at 15°C.
  - After one month, she removed the leaves from the soil. Then she drew the leaves again.

Her drawings are shown in the table below.

Temperature (°C)	Drawing of leaf	
	start	after one month
5		
15		

(a) State the name of **one** group of microorganisms that cause decay. [1]

.....

(b) Describe the results of the investigation shown by the drawings. [2]

.....  
 .....  
 .....

(c) (i) Give **two** ways that Tracy's investigation is a fair test. [2]

I. ....

II. ....

(ii) Why is it important that an investigation should be a fair test? [1]

.....  
.....

(d) Microorganisms in the soil respire.  
State the name of the gas released during respiration. [1]

.....

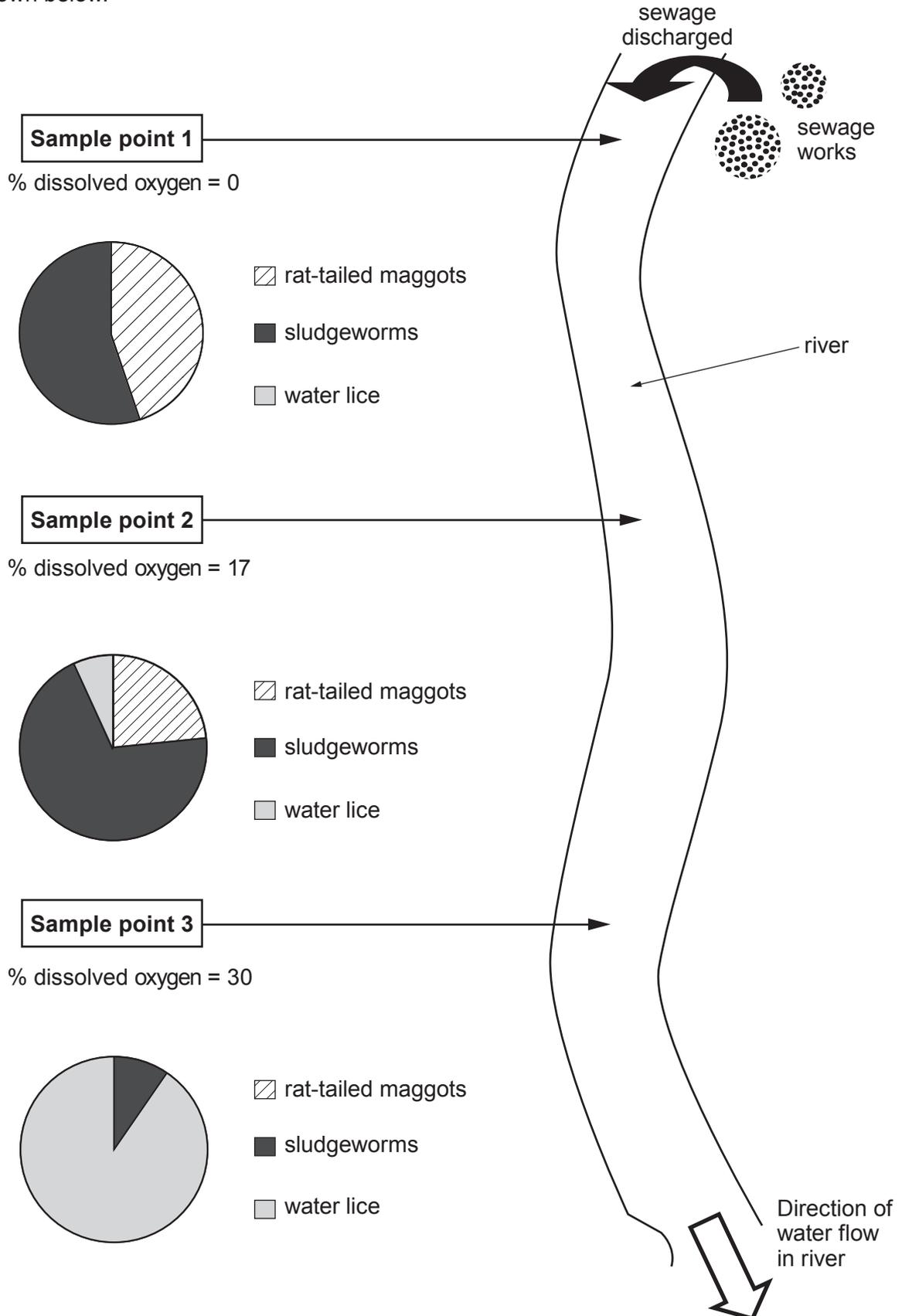
(e) Why would the level of nitrates in the soil in the beakers increase during the investigation? [2]

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.....

9

6. Recent flooding in the UK caused sewage to go into a river. Two weeks after this happened the Environment Agency took samples of river water at 3 sample points 0.5 km apart.

The percentage (%) of dissolved oxygen in the sample was measured. The animals found in the river water samples were counted. The data was then plotted as pie charts. The results are shown below.



Use the information from the diagram opposite to answer the following questions.

- (a) The presence of which **two** animals in the samples indicates **high** levels of water pollution? [2]

.....

- (b) Which animal cannot live in highly polluted water? [1]

.....

- (c) (i) What happens to the percentage of dissolved oxygen as the water flows downstream? [1]

.....

- (ii) Rat-tailed maggots need oxygen to live. At **Sample point 1** there is no oxygen dissolved in the water. Suggest how the rat-tailed maggots can live in this water? [1]

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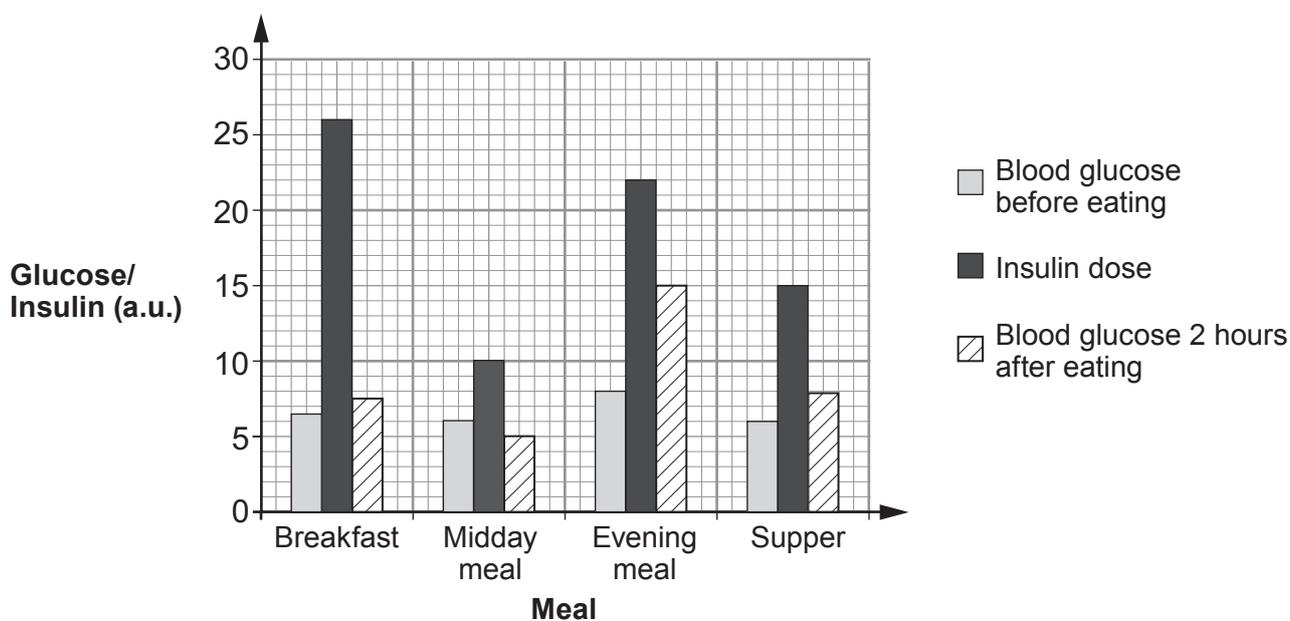
7. Anna has been a diabetic for 6 months. She injects herself with insulin before meals in order to control the level of glucose in her blood. Like all diabetics who have not been injecting insulin for very long she finds it difficult to get the dose correct. Before every meal Anna carries out the following procedure.

1. Measures the concentration of glucose in her blood.
2. Estimates whether the meal she is about to eat has a high, medium or low level of glucose (sugar) in it.
3. Injects insulin, the dose of which depends on the level of glucose in the meal.

Two hours after the meal she measures the concentration of glucose in her blood again.

Anna records all this information on an App, called **Glucose Buddy**, on her iPhone.

The chart below shows Anna's complete record for one day on **Glucose Buddy**.



- (a) (i) Which meal of the day contained the lowest level of glucose? Give a reason for your answer. [2]

Meal .....

Reason .....

.....

- (ii) Anna tries to keep her blood glucose level below 8 a.u. Suggest reasons why her blood glucose level was 15 a.u. two hours after she ate her evening meal. Use only the chart and the information opposite for your answer. [2]

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.....

.....

- (b) How does insulin lower the level of glucose in the blood? [2]

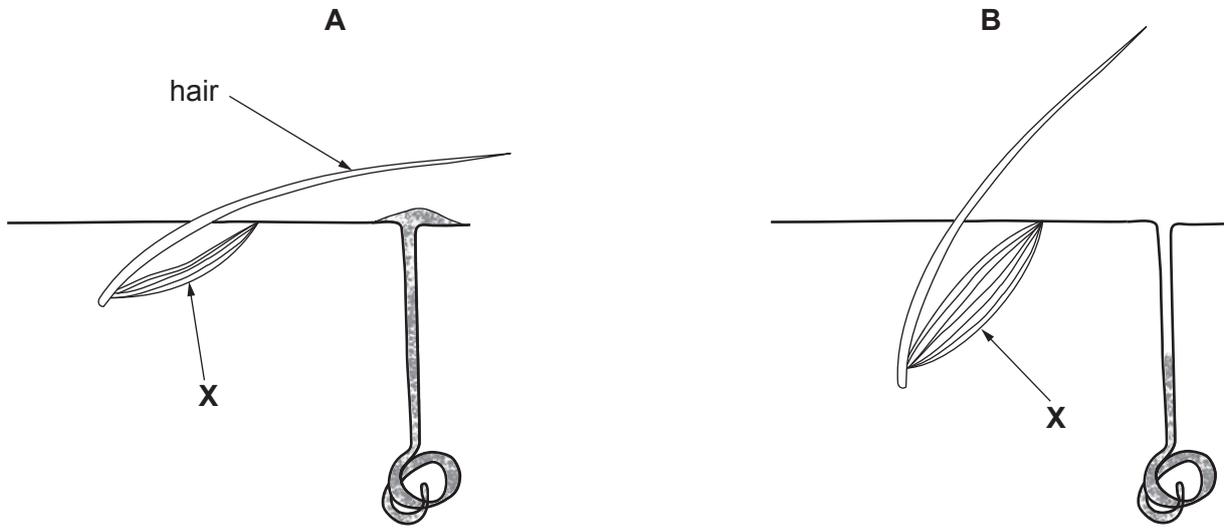
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6

8. Diagrams **A** and **B** below show the skin under two different environmental conditions.



(a) (i) Which of the diagrams shows the skin in hot conditions? ..... [1]

(ii) Give **two** reasons for your answer. [2]

I .....

.....

.....

II .....

.....

.....

(b) If blood vessels had been drawn on the diagrams, the blood vessels in the skin in diagram **B** would be narrower than in diagram **A**. Explain how this helps to control body temperature. [2]

.....

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(c) State how structure **X** on the diagrams above causes the hair to appear as it does in diagram **B**. [1]

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9. In 1960, a survey was done of a large pond on a farm. It was found that it contained a rich variety of aquatic insects, snails and four different fish species.

In 1965, the farmer started growing cereal crops on his land. Pellets containing nitrate were spread on the crops several times a year. By 1975, the pond had become overgrown with algae and other aquatic plants. A new survey found that there were very few aquatic insects and no fish species.



Pellets containing nitrate

- (a) State why the farmer spread nitrate on the cereal crops.

[1]

.....

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