WJEC CBAC

GCSE

4461/01

SCIENCE A/BIOLOGY

BIOLOGY 1
FOUNDATION TIER

A.M. WEDNESDAY, 8 January 2014

1 hour

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	
Total	60	

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

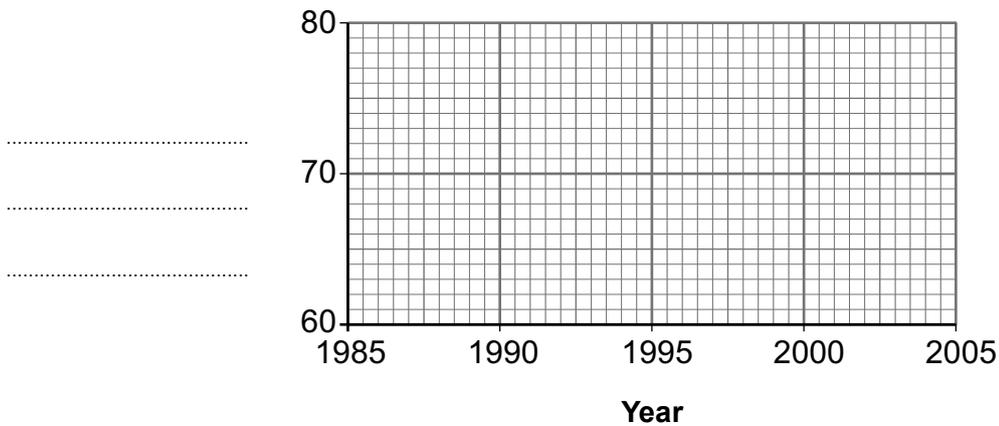(i) Using the data above, plot a line graph on the grid below by:

   I.   Labelling the vertical axis.   [1]
   II. Plotting the points.   [2]
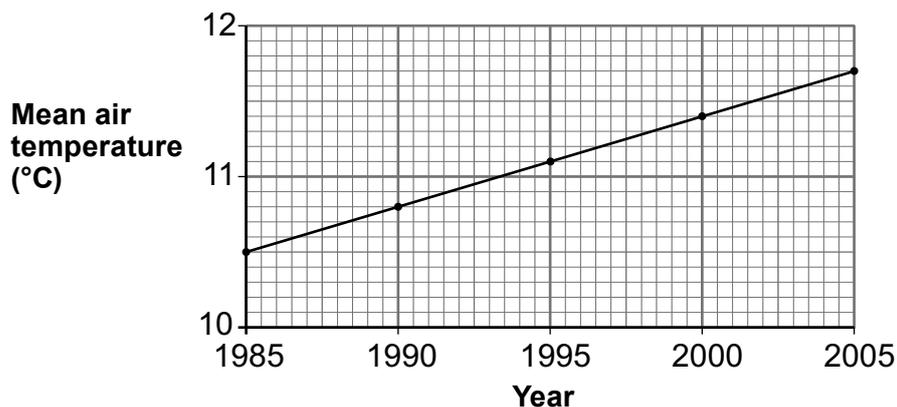   III. Joining the points with a ruler.   [1]

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

Some scientists have the opinion that the change in the percentage of dark sheep on the island is due to a change in the mean air temperature.

I.   Using **both** of the graphs opposite, describe the evidence that supports the scientists' opinion.   [1]

....

....

....

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

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

....

....

....

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 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 and 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 <u>underlining</u> the correct word or words for each.

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

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

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

(b) Look at the family tree below.
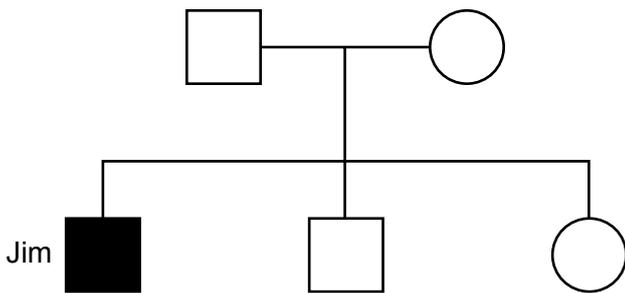
Key:

☐ Male without cystic fibrosis

◯ Female without cystic fibrosis

■ Male with cystic fibrosis

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

(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

....

8

5. Tracy investigated decay using two leaves of the same size from the same tree.

- She made a drawing of each leaf.
- She then buried each leaf in a separate beaker each containing 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 and drew them 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) State why the level of nitrates in the soil in the beakers would increase during the investigation. [2]

....

....

....

9

6. Recent flooding in the UK caused a sewage discharge into a river. Two weeks after the discharge 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 and the animals in the samples were counted and the data plotted as pie charts. The results are shown below.

sewage discharged

sewage works

river

Sample point 1

% dissolved oxygen = 0

▨ rat-tailed maggots

■ sludgeworms

□ water lice

Sample point 2

% dissolved oxygen = 17

▨ rat-tailed maggots

■ sludgeworms

□ water lice

Sample point 3

% dissolved oxygen = 30

▨ rat-tailed maggots

■ sludgeworms

□ water lice

Direction of water flow in river
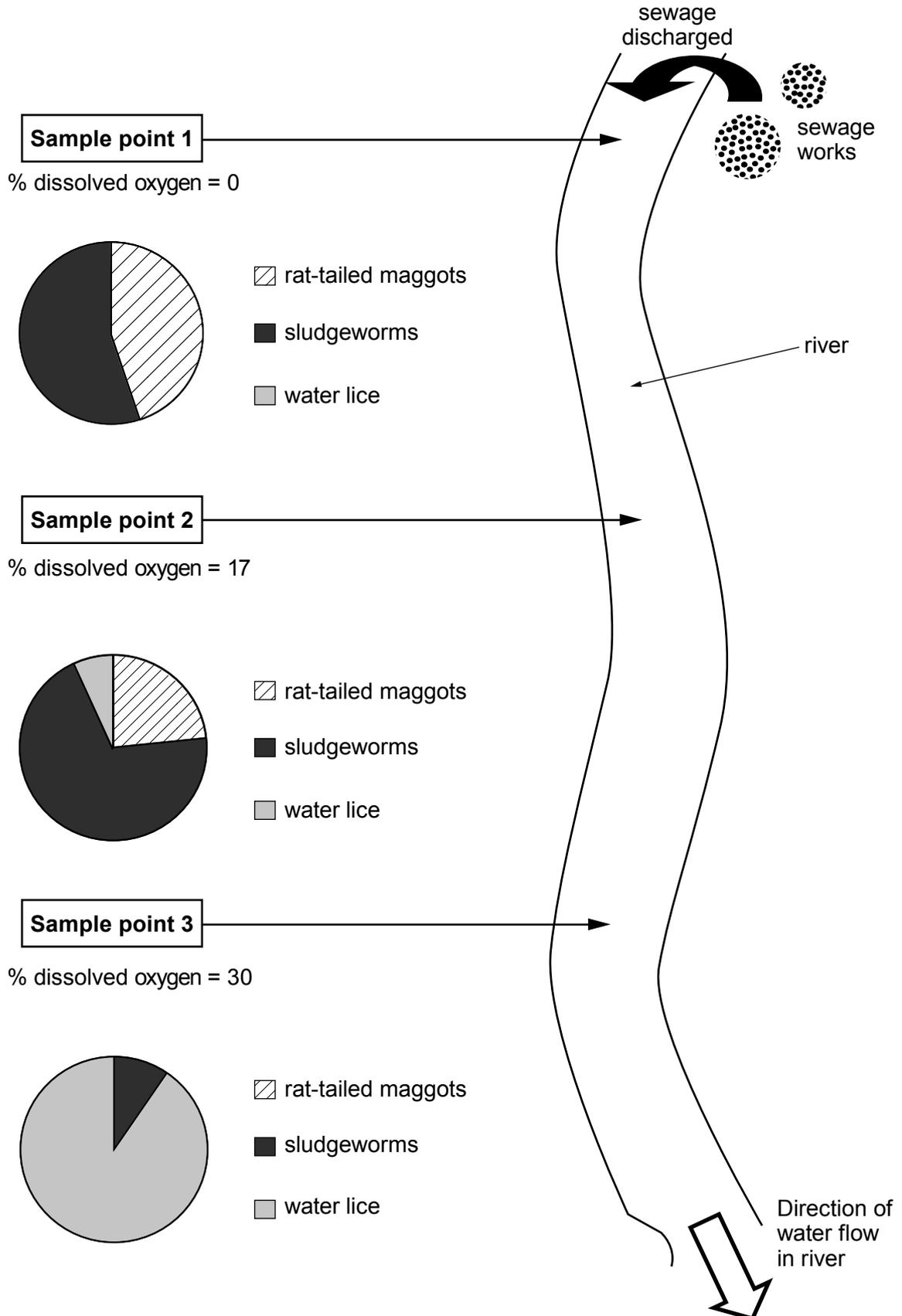
Use the information from the diagram opposite to answer the following questions.

(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. Suggest how they can live at **Sample point 1** where there is no oxygen dissolved in the water. [1]

....

....

5

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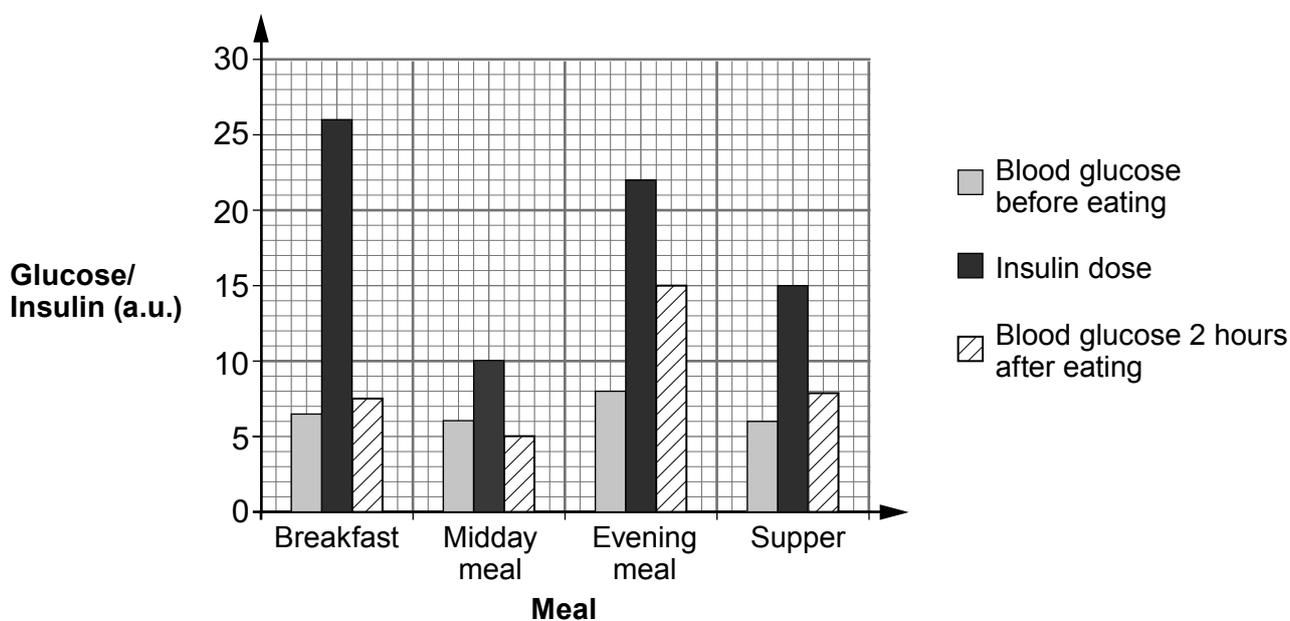
(a) (i) Which meal of the day did Anna estimate contained the lowest level of glucose? Give a reason for your answer. [2]

Meal ....

Reason ....

....

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

....

....

....

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

....

....

....

6

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

A   **B**

hair

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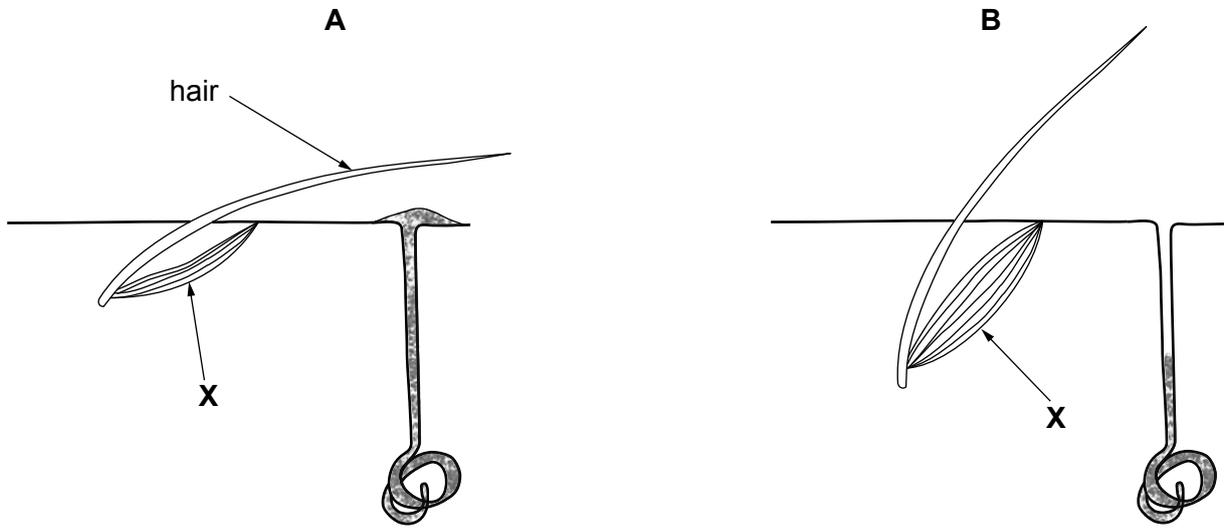
(a) (i) Which of the diagrams shows the skin in hot conditions? .... [1]

(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]

....

....

....

(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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6

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 Turn over.

9. In 1960, a survey of a large pond on a farm 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 and 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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(b) Use the information opposite and your own knowledge to explain the changes which occurred in the pond. [6 QWC]

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END OF PAPER

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