AQA

Please write clearly in block capitals.

Centre number | | | | | | Candidate number | | | | |

Surname _____

Forename(s) _____

Candidate signature _____

GCSE
Biology

H

Higher Tier Unit Biology B3

Friday 10 June 2016 Morning Time allowed: 1 hour

Materials
For this paper you must have:
- a ruler.

You may use a calculator.

Instructions
- Use black ink or black ball-point pen.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer the questions in the spaces provided. Do not write outside the box around each page or on blank pages.
- Do all rough work in this book. Cross through any work you do not want to be marked.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You are expected to use a calculator where appropriate.
- You are reminded of the need for good English and clear presentation in your answers.
- Question 3 should be answered in continuous prose.
  In this question you will be marked on your ability to:
  – use good English
  – organise information clearly
  – use specialist vocabulary where appropriate.

Advice
- In all calculations, show clearly how you work out your answer.

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

1 Cells, tissues and organs are adapted to take in different substances and get rid of different substances.

Table 1 shows the concentration of four ions outside cells and inside cells.

Table 1

Ion	Concentration outside cells in mmol per dm^3	Concentration inside cells in mmol per dm^3
Sodium	140	9
Potassium	7	138
Calcium	2	27
Chloride	118	3

1 (a) Use information from **Table 1** to complete the following sentences.

[2 marks]

Sodium ions will move into cells by the process

of _____ .

Potassium ions will move into cells by the process

of _____ .

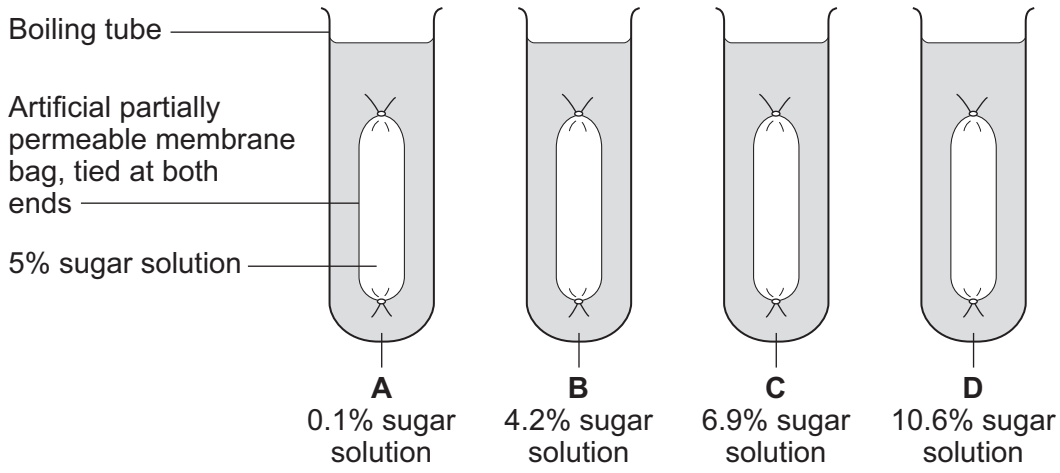
1 (b) Some students investigated the effect of the different concentrations of sugar in four drinks, **A**, **B**, **C** and **D**, on the movement of water across a partially permeable membrane.

The students:

- made four bags from artificial partially permeable membrane
- put equal volumes of 5% sugar solution in each bag
- weighed each bag containing the sugar solution
- placed one bag in each of the drinks, **A**, **B**, **C** and **D**
- after 20 minutes removed the bags containing the sugar solution and weighed them again.

Figure 1 shows how they set up the investigation.

Figure 1



1 (b) (i) The bag in drink **A** got heavier after 20 minutes.

Explain why.

[3 marks]

1 (b) (ii) In which drink, **A**, **B**, **C** or **D**, would you expect the bag to show the smallest change in mass?

[1 mark]

Tick (✓) **one** box.

A ☐ **B** ☐ **C** ☐ **D** ☐

1 (b) (iii) Explain why you think the bag you chose in part **(b)(ii)** would show the smallest change.

[2 marks]

8

2 (a) Carbon dioxide enters a plant through stomata on the leaves.

Name the cells that control the size of the stomata.

[1 mark]

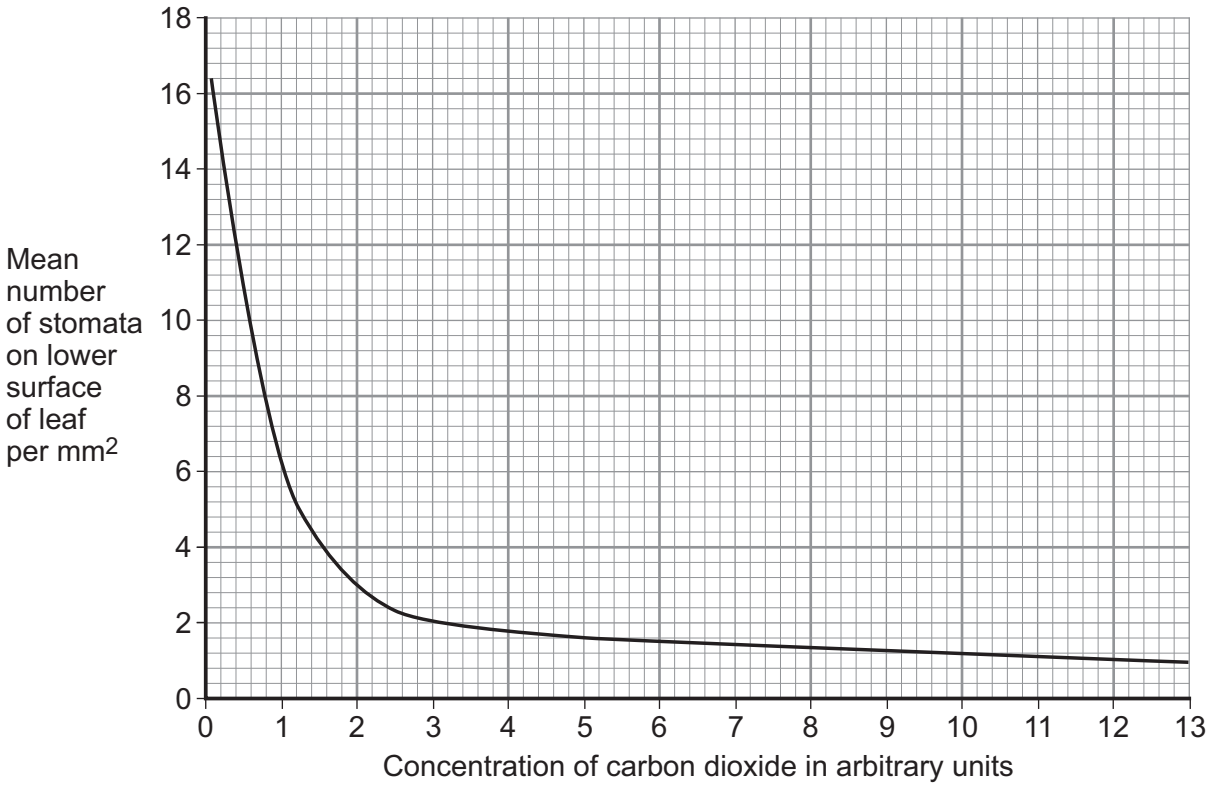
_____

2 (b) Scientists grew tomato plants in air containing different concentrations of carbon dioxide.

The scientists recorded the number of stomata found on the lower surface of the leaves of plants grown at each carbon dioxide concentration.

Figure 2 shows the results.

Figure 2



2 (b) (i) Describe the relationship between the mean number of stomata per mm^2 and carbon dioxide concentration.

[2 marks]

2 (b) (ii) Suggest a reason for the relationship you described in part **(b)(i)**.

[1 mark]

2 (c) (i) Suggest **one** disadvantage to a plant of having a large number of stomata per mm^2 on each leaf.

[1 mark]

2 (c) (ii) Suggest **one** environmental condition where a large number of stomata per mm^2 on each leaf would be a disadvantage.

[1 mark]

6

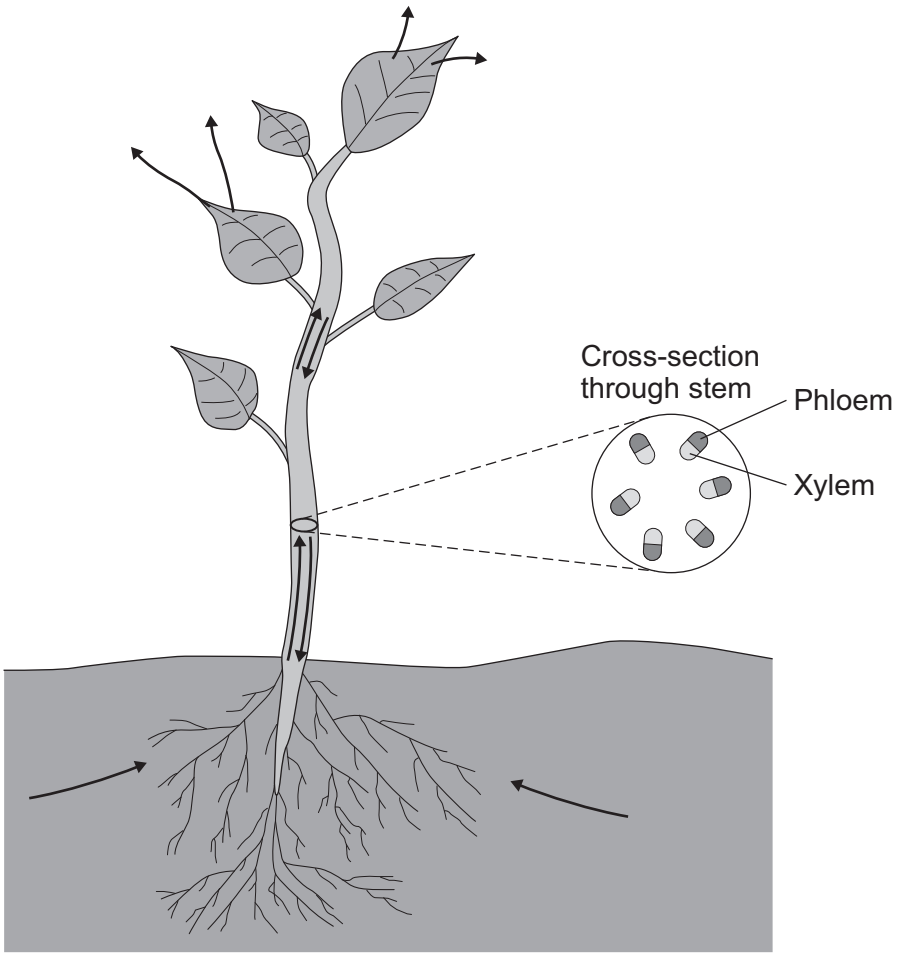
Turn over for the next question

3 **In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.**

Plants transport many substances between their leaves and roots.

Figure 3 shows the direction of movement of substances through a plant.

Figure 3



Describe how **ions**, **water** and **sugar** are obtained and transported through plants.

In your answer you should refer to materials moving upwards in a plant and to materials moving downwards in a plant.

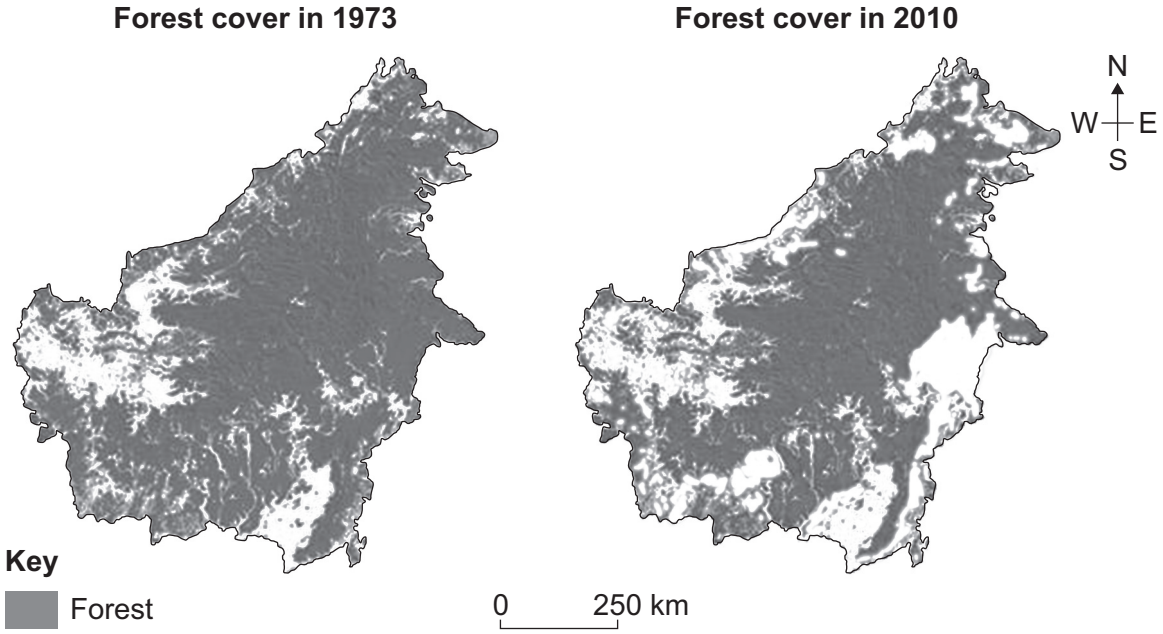
[6 marks]

Extra space

6

4 **Figure 4** shows the amount of forest cover on an island in Asia, in 1973 and in 2010.

Figure 4



4 (a) (i) Deforestation has decreased the amount of forest cover on the island.

Describe the change in the pattern of forest cover on the island.

[2 marks]

4 (a) (ii) Give **two** possible reasons why the amount of forest has decreased between 1973 and 2010.

[2 marks]

1 _____

2 _____

4 (b) Scientists are concerned about the effects of a decrease in forest cover on ecosystems.

Give **two** possible negative effects of the decrease in forest cover on ecosystems.

[2 marks]

1 _____

_____

2 _____

_____

6

Turn over for the next question

5 When we breathe in and breathe out the ribs and the diaphragm move.

5 (a) Complete **Table 2** to describe the changes that occur when we breathe in.

[2 marks]

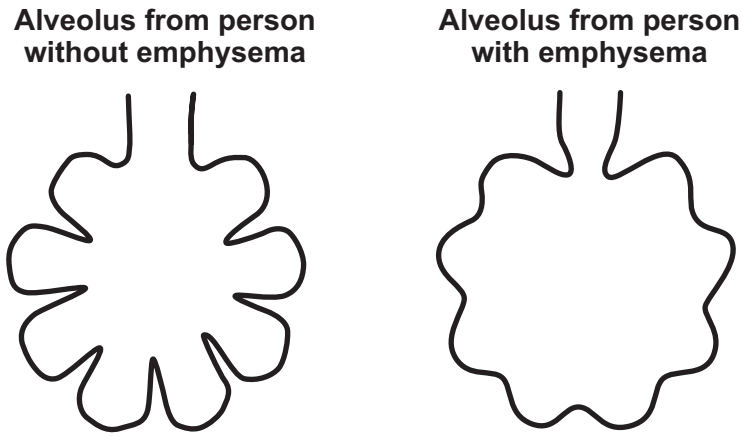
Table 2

	Movement of the ribs	**Movement of the diaphragm**	**Change in volume of the thorax**
Breathing in	up and out		

5 (b) Emphysema is a disease affecting the lungs. People with emphysema are often short of breath and find exercise difficult.

Figure 5 shows an alveolus from a person without emphysema and an alveolus from a person with emphysema.

Figure 5



5 (b) (i) Describe **one** difference between the alveolus from a person without emphysema and the alveolus from a person with emphysema.

[1 mark]

_____

_____

5 (b) (ii) Explain how the difference you described in part **(b)(i)** causes the person with emphysema to find exercise difficult.

[3 marks]

_____

_____

_____

_____

_____

_____

6

Turn over for the next question

6 The circulatory system contains arteries and veins.

6 (a) (i) Describe how the structure of an artery is different from the structure of a vein.

[2 marks]

_____

_____

_____

_____

6 (a) (ii) A comparison is made between blood taken from an artery in the leg and blood taken from a vein in the leg.

Give **two** differences in the composition of the blood.

[2 marks]

1 _____

_____

2 _____

_____

6 (b) During operations patients can lose a lot of blood. Patients often need blood transfusions to keep them alive.

Figure 6 shows information about a new artificial blood product.

Figure 6

Sea worms give hope for people in need of blood transfusions

Scientists have carried out a five-year trial using a new artificial blood product. The scientists have used a protein from sea worms to create the new artificial blood and the results from the trial are very positive. Thousands of sea worms can be grown and collected.

During the trial, mice were given blood transfusions of the artificial blood. The bodies of the mice tolerated the artificial blood and the artificial blood did not cause any side effects.

Suggest **two** possible advantages of using the new artificial blood, instead of using human blood for a transfusion in humans.

[2 marks]

1 _____

_____

2 _____

_____

6

Turn over for the next question

7 Humans keep their internal conditions almost constant.

Body temperature is kept within a narrow range.

When the core body temperature is too low, this is detected by the thermoregulatory centre in the brain.

Describe how the body responds when a decrease in core body temperature is detected.

[6 marks]

6

Turn over for the next question

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED

8 People with type 1 diabetes inject insulin to control their blood glucose level.

A pancreas transplant is another treatment for type 1 diabetes.

One risk of a pancreas transplant is organ rejection.

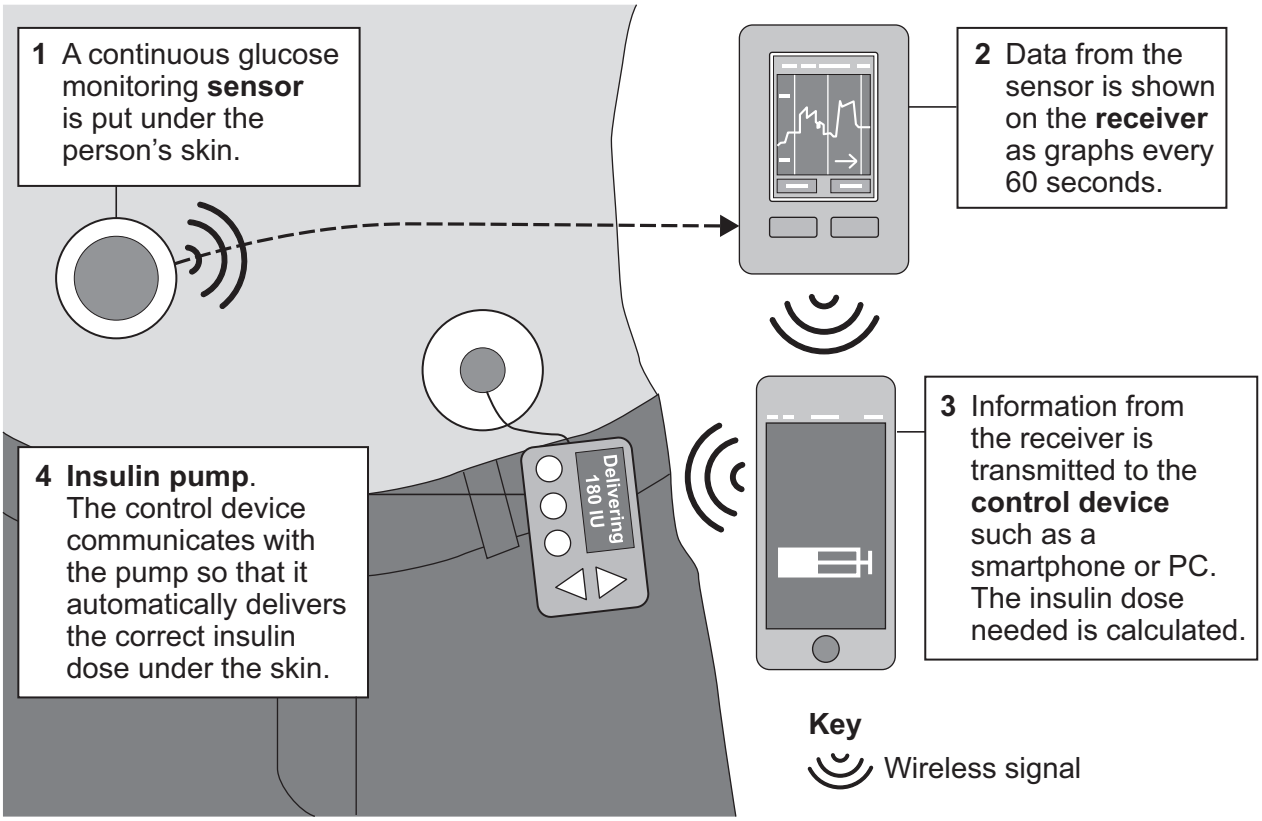
8 (a) Explain why a transplanted organ may be rejected.

[3 marks]

8 (b) Scientists have developed an artificial pancreas to treat type 1 diabetes.

Figure 7 shows how an artificial pancreas works.

Figure 7



8 (b) (i) A woman with type 1 diabetes has an artificial pancreas. The woman eats a meal high in sugar. The meal causes her blood glucose level to rise.

Use information from **Figure 7** to describe what happens to bring the blood glucose level of the woman back to normal.

[4 marks]

8 (b) (ii) The traditional way of monitoring and treating type 1 diabetes is to take a small sample of blood and put it on a test strip to find out how much insulin to inject.

Suggest **one** possible advantage, other than not having to do blood tests, of the method used in **Figure 7**.

[1 mark]

8

Turn over for the next question

9 **Figure 8** shows some information about 'stem cell burgers'.

Figure 8

The first laboratory burger has now been cooked

In July 2013 the first burger grown from cow stem cells was cooked.

Muscle stem cells from cows were grown into strands of beef in a laboratory. About 20 000 strands of beef were then made into a burger. The burger can be cooked and eaten by humans. This type of meat is called cultured meat.

The cultured meat is exactly the same as normal cow muscle tissue and the cells are not genetically modified.

9 (a) (i) Some scientists think using cultured meat instead of traditionally-produced meat will help reduce global warming.

Suggest **two** reasons why using cultured meat may slow down the rate of global warming.

[2 marks]

1 _____

_____

2 _____

_____

9 (a) (ii) Suggest **two** other possible advantages of producing cultured meat instead of farmed meat.

Do **not** refer to cost in your answer.

[2 marks]

1 _____

_____

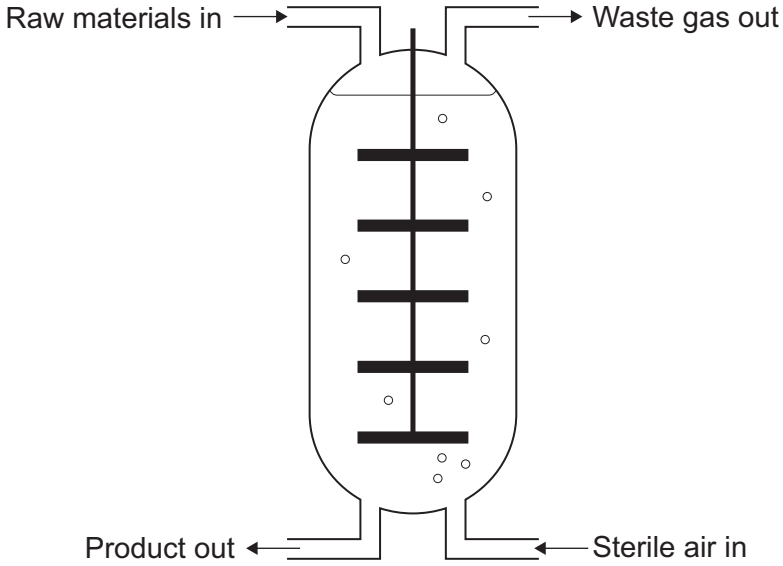
2 _____

_____

9 (b) Mycoprotein is one type of food that is mass-produced.

Figure 9 shows a fermenter used to produce mycoprotein.

Figure 9



Describe how mycoprotein is produced.

[4 marks]

8

END OF QUESTIONS

There are no questions printed on this page

DO NOT WRITE ON THIS PAGE
ANSWER IN THE SPACES PROVIDED