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 9 June 2017 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.

For Examiner's Use	
Examiner's Initials	
Question	Mark
1	
2	
3	
4	
5	
6	
7	
8	
9	
TOTAL	

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

1 Large areas of forest are cut down each year. This is called deforestation.

1 (a) Apart from decay, describe how the removal of trees from forests can lead to global warming.

[1 mark]

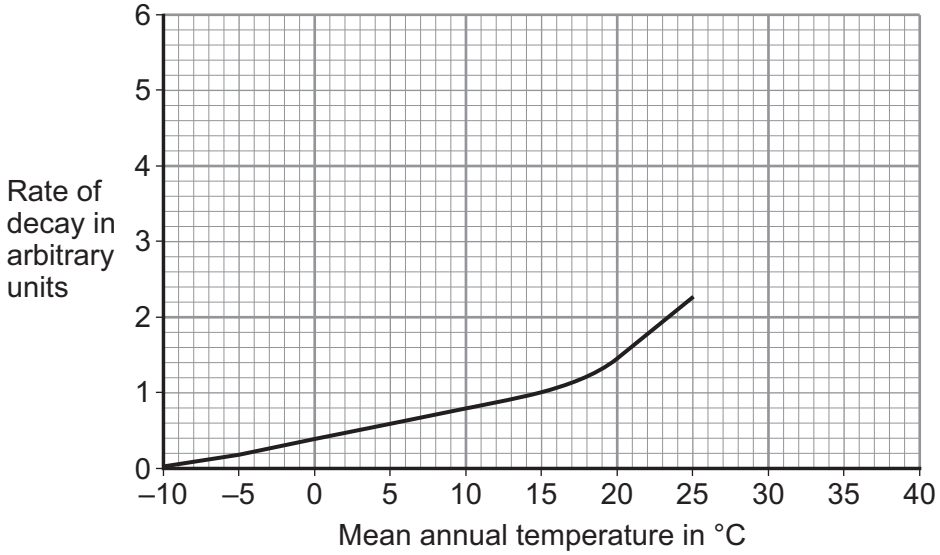
_____

_____

1 (b) After trees have been cut down, branches and leaves are left on the ground to decay.

Figure 1 shows how the rate of decay changes with the mean annual temperature in different environments.

Figure 1



1 (b) (i) The mean annual temperature in forest **A** is 10 °C.

What is the rate of decay in forest **A**?

[1 mark]

Rate of decay = _____ arbitrary units

1 (b) (ii) Forest **B** has a mean annual temperature of 30 °C.

Use information from **Figure 1** to predict the rate of decay in forest **B**.

[1 mark]

Rate of decay = _____ arbitrary units

1 (c) Describe how decay in forests contributes to global warming.

[2 marks]

_____

_____

_____

_____

5

Turn over for the next question

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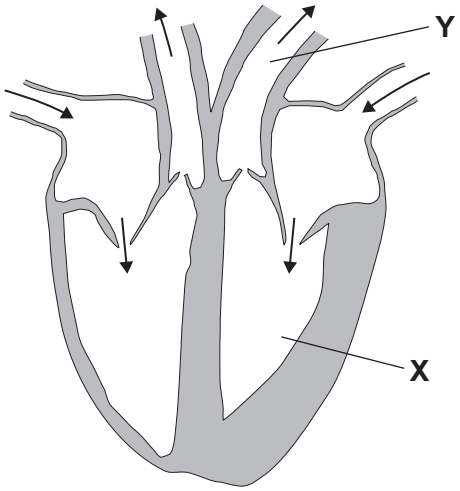
ANSWER IN THE SPACES PROVIDED

2 Each year people need to have treatment for heart problems.

Figure 2 shows a human heart.

Figure 2



2 (a) (i) Name part **X** in **Figure 2**.

[1 mark]

_____

2 (a) (ii) Name part **Y** in **Figure 2**.

[1 mark]

_____

2 (a) (iii) There are valves inside the heart.

What is the function of these valves?

[1 mark]

_____

_____

Question 2 continues on the next page

2 (b) Some patients need to have their heart valves replaced.

Table 1 shows the percentage of patients who died from different causes after having heart valve replacements.

Two types of heart valve were used:

- mechanical – made of metal and plastic
- pig tissue – made from pig heart tissue on a metal frame.

The data was collected over 15 years and 400 patients were involved.

Table 1

Cause of death	**Percentage of patients who died**	
	Mechanical valve	**Pig tissue valve**
Blood clots blocking coronary arteries	9	9
Bleeding	26	15
Second operation	5	15
Bacterial heart infection	4	8
Heart valves stopped working	0	12

Use information from **Table 1** and your own knowledge to answer the following question.

A patient decides to have a mechanical valve replacement rather than a pig tissue valve replacement.

Suggest reasons for **and** against choosing a mechanical valve.

[4 marks]

2 (c) Some people have narrowed arteries.

Describe how stents can be used to prevent a heart attack in a person with narrowed arteries.

[2 marks]

9

Turn over for the next question

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

Humans need to remove (excrete) waste products from the bloodstream.

Describe the processes that produce waste products **and** how the products are removed from the body.

In your answer you should include the names of the organs involved in producing waste products and those involved in removing the waste products.

You should **not** refer to faeces in your answer.

[6 marks]

Extra space

6

4 Human activities pollute the air with smoke and gases.

One of these gases is sulfur dioxide.

4 (a) What effect does sulfur dioxide have on our environment?

[1 mark]

Tick (✓) **one** box.

Causes acid rain ☐

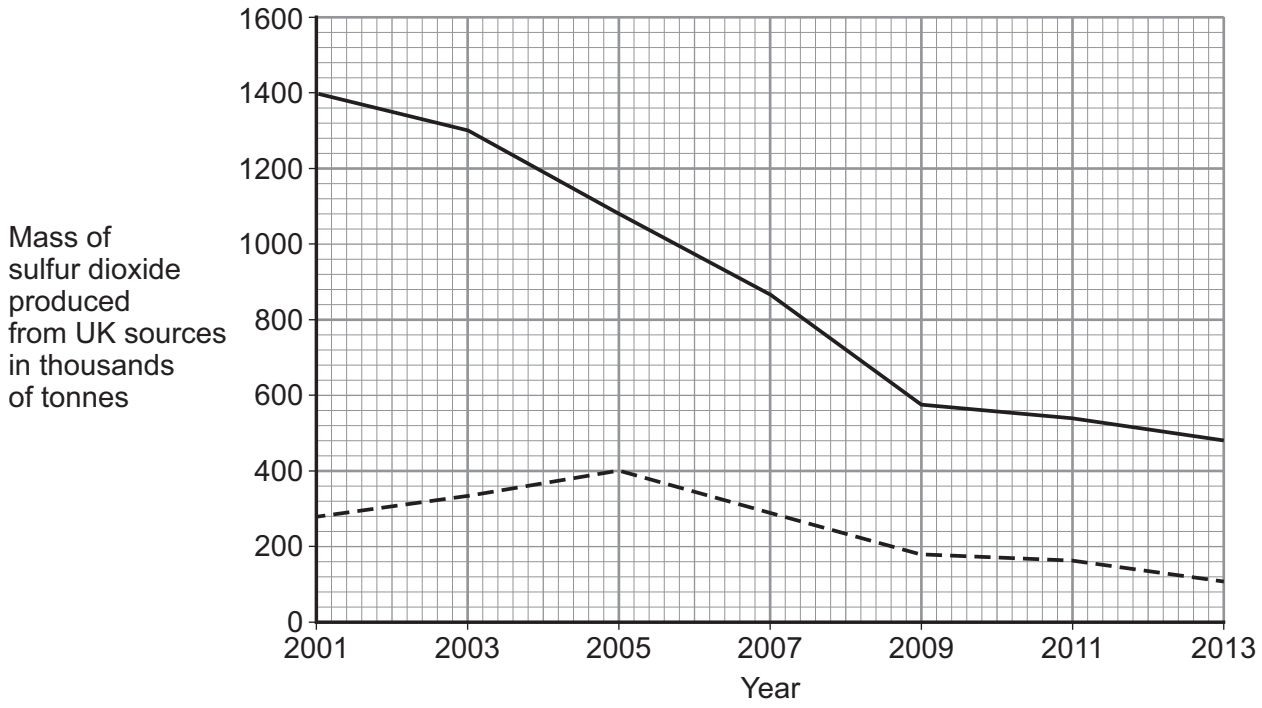
Causes global warming ☐

Causes more carbon sequestering ☐

Causes sea levels to rise ☐

4 (b) **Figure 3** shows how the mass of sulfur dioxide produced from UK sources changed from 2001 to 2013.

Figure 3



4 (b) (i) The mass of sulfur dioxide produced from all UK sources has decreased.

Use information from **Figure 3** to complete the following calculation of the percentage decrease in the mass of sulfur dioxide produced.

[2 marks]

Total mass of sulfur dioxide produced in 2001 = _____ thousand tonnes

Total mass of sulfur dioxide produced in 2013 = 480 thousand tonnes

Decrease in mass of sulfur dioxide produced = _____ thousand tonnes

Percentage decrease working out: _____

_____

_____

Percentage decrease = _____

4 (b) (ii) Use data from **Figure 3** to describe the pattern in the mass of sulfur dioxide produced from the UK transport industry from 2001 to 2013.

[2 marks]

_____

_____

_____

_____

5

Turn over for the next question

5 Plants have transport systems.

5 (a) In **Table 2**, name **two** tissues that transport substances through a plant. For each tissue, name **one** substance that it transports.

[2 marks]

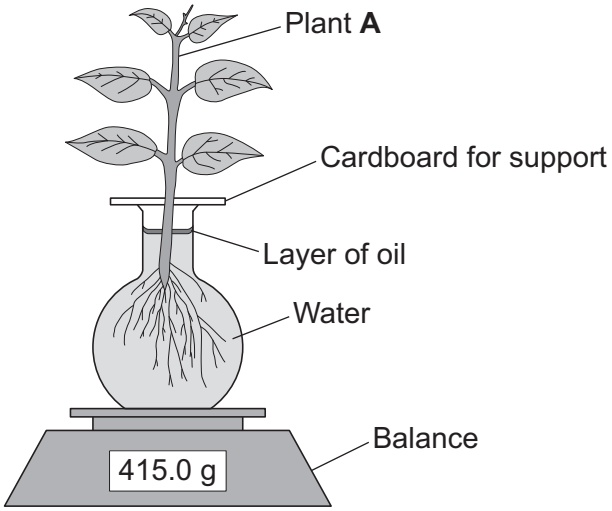
Table 2

Tissue	Substance transported
1 _____	_____
2 _____	_____

5 (b) A student investigated the rate of transpiration in four different plant species, **A**, **B**, **C** and **D**.

He set up the apparatus for plant **A** as shown in **Figure 4**.

Figure 4



In each experiment he:

- recorded the mass of the apparatus at the start of the experiment
- recorded the mass every 5 minutes for 30 minutes
- repeated the experiment with plants **B**, **C** and **D**.

Figure 5 shows his results.

Figure 5

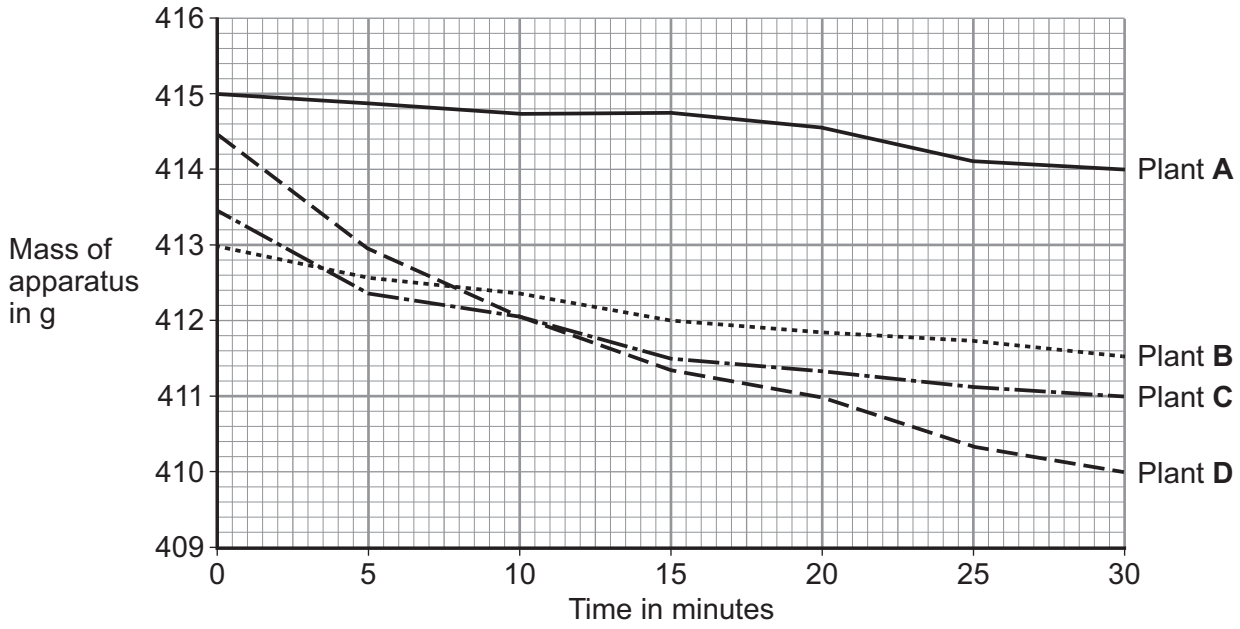


Table 3 shows information about the four plant species.

Table 3

Plant species	Mean number of stomata per mm^2 of leaf
Bellflower	42.74
Caraway	117.50
Goosegrass	6.94
Clover	387.33

5 (b) (i) The student concluded that plant **D** was clover.

Use information from **Figure 5** and **Table 3** to suggest an explanation for the student's conclusion.

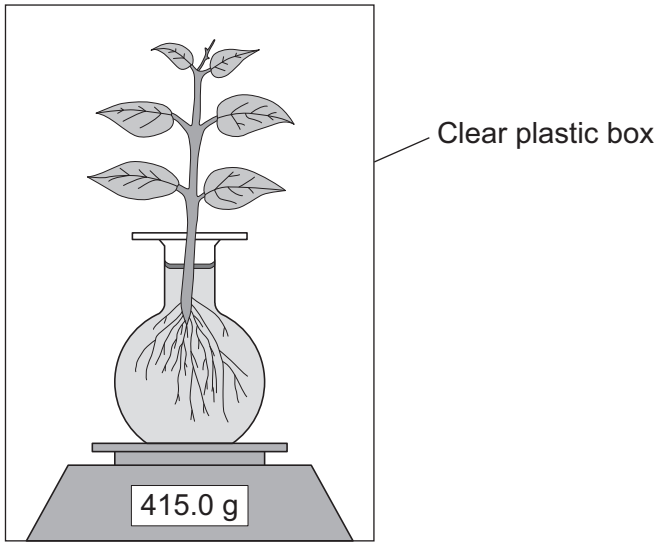
[3 marks]

5 (b) (ii) The student carried out another experiment using plant **A**.

The student used the same apparatus and method.

In this experiment the apparatus was placed in a clear plastic box for the 30 minutes, as shown in **Figure 6**.

Figure 6



Explain what would happen to the rate of water loss due to transpiration in this experiment compared to the first investigation.

[3 marks]

8

Turn over for the next question

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6 Many people drink sports drinks after exercise.

Table 4 shows some data about five different sports drinks, **P**, **Q**, **R**, **S** and **T**.

Table 4

		Mass per 100 cm^3		
Sports drink	**Concentration of the drink in arbitrary units**	**Sodium ions in mg**	**Potassium ions in mg**	**Substance X in g**
P	260	45	21	10
Q	170	48	24	9
R	270	112	38	2
S	280	25	6	10
T	493	6	3	13

6 (a) Substance **X** in **Table 4** is used during exercise.

Substance **X** releases energy during exercise.

What is substance **X**?

[1 mark]

_____

6 (b) A sports scientist investigated the effectiveness of sports drinks. She made the following statements:

- the best sports drinks have a slightly lower concentration than blood plasma
- the mean concentration of blood plasma is 280 arbitrary units
- the closer the ratio of sodium ions to potassium ions is to 2:1, the more effective the sports drink.

6 (b) (i) Calculate the ratio of sodium ions to potassium ions in drink **R**.

[1 mark]

_____

_____

Ratio = _____

6 (b) (ii) The scientist stated:

'sports drink **P** is the most effective sports drink'

Use information from part **(b)** and **Table 4** to give reasons why the scientist made this statement.

[2 marks]

6 (b) (iii) Blood cells were placed in a sample of sports drink **T**.

The concentration inside the blood cells was 280 arbitrary units.

Explain what would happen to the blood cells.

[3 marks]

7

Turn over for the next question

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7 A climber falls down a mountain slope into a small pool of cold water.
He is injured and cannot move.
He starts to get cold.

7 (a) How does the body detect a decrease in blood temperature?

[1 mark]

7 (b) The man starts shivering.

Explain how shivering helps to raise his body temperature.

[3 marks]

7 (c) Apart from shivering, explain how the man's body responds to raise his core body temperature.

[3 marks]

7

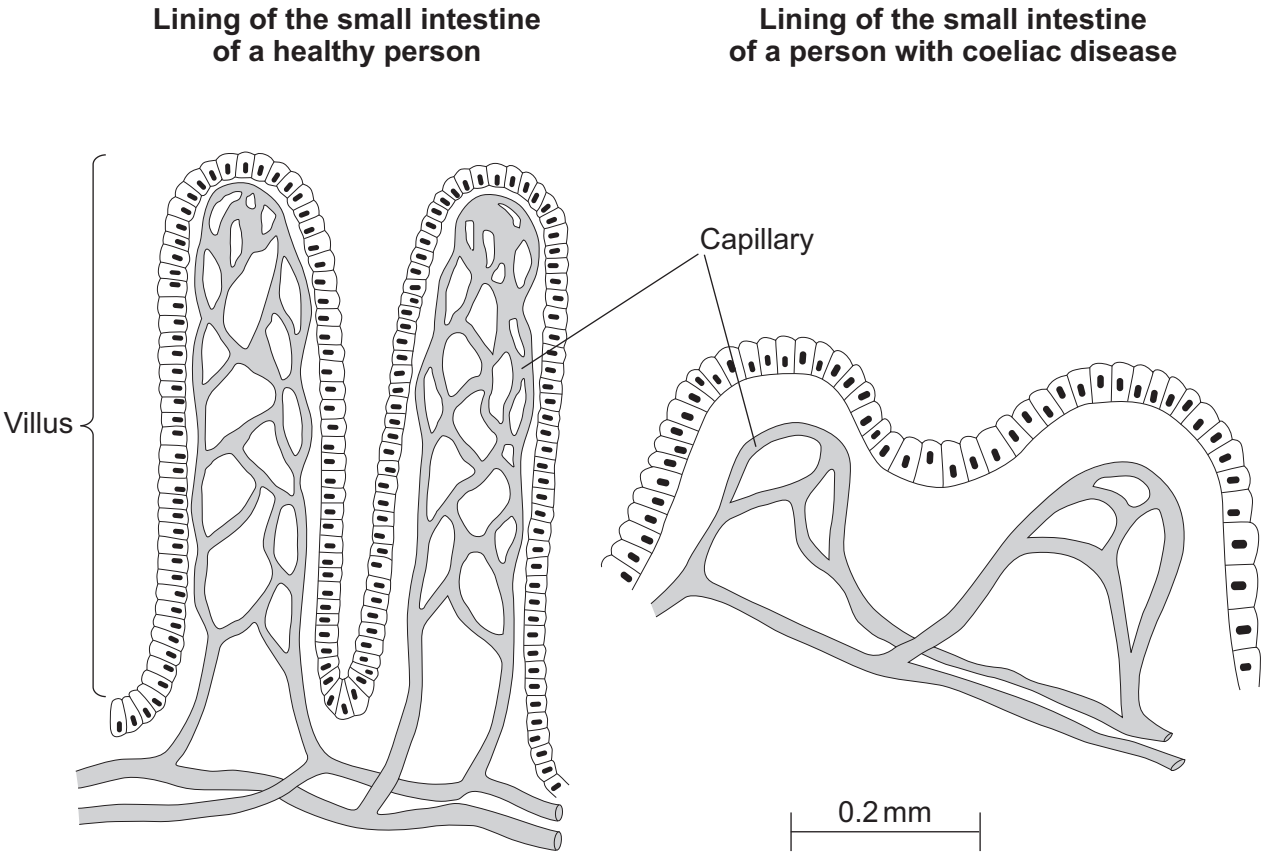
8 Some people have coeliac disease. Coeliac disease affects the small intestine.

Symptoms of coeliac disease include:

- weight loss
- low levels of vitamins and minerals in the body
- tiredness.

Figure 7 shows the lining of the small intestine of a healthy person and the lining of the small intestine of a person with coeliac disease.

Figure 7



8 (a) Explain how the changes in the villi of a person with coeliac disease may cause the person to lose weight and have low amounts of vitamins and minerals in their body.

[5 marks]

8 (b) Some of the uptake of glucose in the small intestine occurs by active transport.

Describe the process of active transport.

[2 marks]

7

Turn over for the next question

9 (a) In a healthy person, blood sugar levels are kept within a narrow range.

Describe what happens in a healthy person when the pancreas detects a rise in blood sugar level.

[2 marks]

9 (b) Glycogen storage disorder is an inherited condition affecting a small number of people.

In some people with the disorder, glycogen does not form properly.

After exercise, a person with this type of glycogen storage disorder can feel very tired and can become unconscious.

Explain why the person has these symptoms after exercise.

[4 marks]

6

END OF QUESTIONS

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