Centre Number						Candidate Number				
Surname										
Other Names										
Candidate Signature										

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

General Certificate of Secondary Education
Foundation Tier
June 2015

Biology
Unit Biology B3

BL3FP

F

Tuesday 12 May 2015 1.30 pm to 2.30 pm

For this paper you must have:
- a ruler.

You may use a calculator.

Time allowed
- 1 hour

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 8(c) 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.

A

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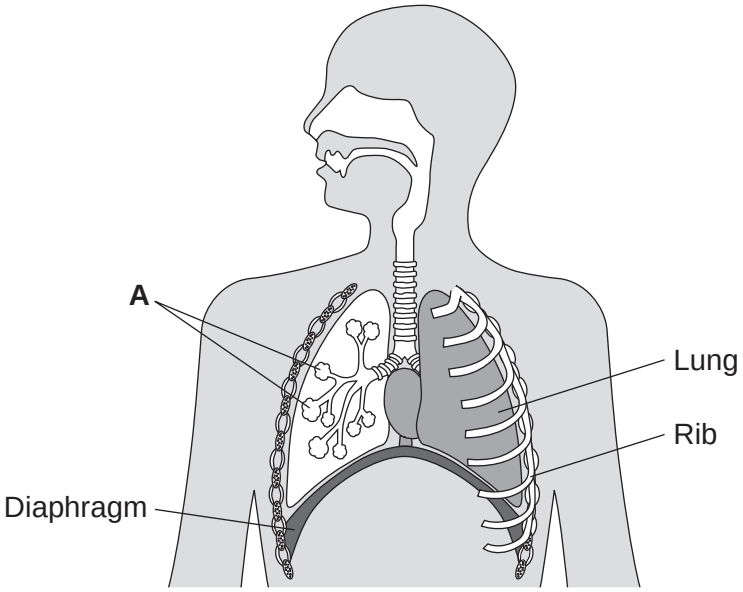
Answer **all** questions in the spaces provided.

1 Our lungs help us to breathe.

Figure 1 shows the human breathing system.

Figure 1



1 (a) (i) Name part **A** in **Figure 1**.

[1 mark]

.....

1 (a) (ii) Give **one** function of the ribs.

[1 mark]

.....

1 (b) (i) Use the correct answer from the box to complete the sentence.

[1 mark]

active transport	**diffusion**	**osmosis**

Oxygen moves from the air inside the lungs into the blood by the process of ..... .

Do not write outside the box

1 (b) (ii) Use the correct answer from the box to complete the sentence.

[1 mark]

arteries	**capillaries**	**veins**

Oxygen moves from the lungs into the blood through the walls

of the ..... .

1 (b) (iii) Inside the lungs, oxygen is absorbed from the air into the blood.

Give **two** adaptations of the lungs that help the rapid absorption of oxygen into the blood.

[2 marks]

1 .....

.....

2 .....

.....

6

Turn over for the next question

2 The human population is increasing and more household waste is being produced.

2 (a) Give **one** way in which an increase in household waste affects our environment.

[1 mark]

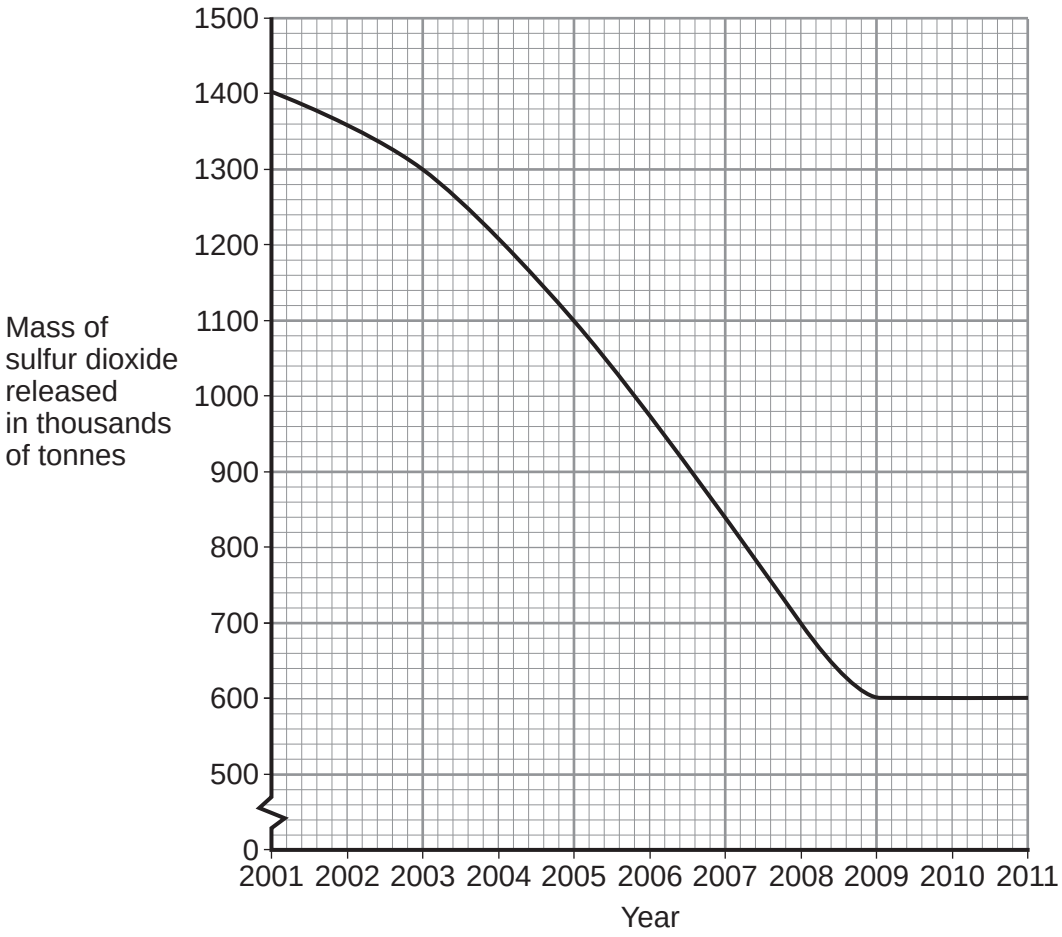
.....

.....

2 (b) The release of sulfur dioxide affects our environment.

Figure 2 shows how the mass of sulfur dioxide released in the UK has changed from 2001 to 2011.

Figure 2



2 (b) (i) Describe the pattern shown in **Figure 2**.

[2 marks]

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2 (b) (ii) In 2001, 1400 thousand tonnes of sulfur dioxide were released.

By which year had the amount of sulfur dioxide released reduced to half of this amount?

[2 marks]

.....

.....

.....

Year = ...

2 (b) (iii) Give **one** problem caused when sulfur dioxide gas is in the air.

[1 mark]

.....

.....

2 (c) Carbon dioxide is another gas that affects the environment.

Which **two** of the following help to reduce the levels of carbon dioxide in the atmosphere by storing carbon dioxide?

[2 marks]

Tick (✓) **two** boxes.

Animals respiring ☐

Carbon dioxide being absorbed in oceans and lakes ☐

Photosynthesis by trees ☐

The production of biogas ☐

8

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ANSWER IN THE SPACES PROVIDED

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3 (a) Humans need to remove waste products from their bodies.

Which organ removes waste carbon dioxide from the body?

[1 mark]

Tick (✓) **one** box.

Liver ☐

Lung ☐

Skin ☐

3 (b) Kidneys make urine. Urine is stored in the bladder.

Which **one** of the following stages is involved in making urine in a healthy kidney?

[1 mark]

Tick (✓) **one** box.

Filtering the blood ☐

Reabsorbing **all** of the ions ☐

Reabsorbing **all** of the water ☐

3 (c) A healthy kidney keeps the correct amount of water in the blood.

If there is too much water in the blood, what might happen to the blood cells?

[1 mark]

Tick (✓) **one** box.

They will take in water and burst. ☐

There will be no change. ☐

They will lose water and shrink. ☐

Question 3 continues on the next page

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3 (d) A child has kidney failure.

A doctor recommends dialysis to treat the kidney failure.

Before dialysis starts, the doctor measures the concentration of glucose and of urea in the child's blood.

The concentration of glucose in the dialysis fluid is 6 mmol per dm^3.

The results are shown in **Table 1**.

Table 1

	Concentration in the blood before dialysis starts in mmol per dm^3
Glucose	6
Urea	28

3 (d) (i) Suggest what the concentration of glucose in the blood will be **after** the dialysis treatment.

Draw a ring around the correct answer.

[1 mark]

less than 6 **6** **more than 6**

3 (d) (ii) Suggest what the concentration of urea in the blood will be **after** the dialysis treatment.

Draw a ring around the correct answer.

[1 mark]

less than 28 **28** **more than 28**

3 (d) (iii) Give a reason for your answer to part **(d)(ii)**.

[1 mark]

.....

.....

Do not write outside the box

3 (e) (i) Some patients have kidney transplants. Transplanted kidneys may be rejected by the body.

Use the correct answer from the box to complete the sentence.

[1 mark]

antibodies	**hormones**	**tissues**

Transplanted kidneys have proteins on the surface of the cells. These proteins may be attacked by the patient's ..... .

3 (e) (ii) It is important to prevent rejection of a new kidney.

Which **one** of the following helps to prevent the kidney from being rejected?

[1 mark]

Tick (✓) **one** box.

Giving the patient antibodies ☐

Giving the patient painkillers ☐

Tissue typing the donor kidney ☐

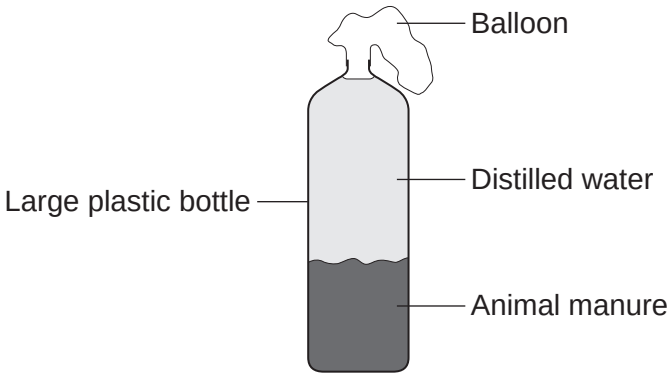
8

Turn over for the next question

4 Some students set up biogas generators to find out which type of animal manure produced the most biogas.

Figure 3 shows the apparatus they used.

Figure 3



The students:
Step 1: Put some cow manure into the plastic bottle
Step 2: Filled the bottle with distilled water
Step 3: Attached a balloon over the top of the bottle
Step 4: Put the bottle in a warm room for 10 days
Step 5: Measured the diameter of the balloon on day 10
Step 6: Repeated steps 1 to 5 using each type of animal manure.

The students' results are shown in **Table 2**.

Table 2

Type of animal manure	Diameter of balloon on day 10 in cm
Cow	29
Horse	26
Sheep	34
Pig	32

Do not write outside the box

4 (a) What is the main gas found in biogas?

[1 mark]

.....

4 (b) The students concluded that sheep manure is the best type of manure to use in a biogas generator.

A teacher told the students that the design of their investigation meant that their conclusion might **not** be correct.

Suggest **two** reasons why.

[2 marks]

1 .....

.....

2 .....

.....

4 (c) Another student suggested that adding potato to the manure would increase the amount of biogas produced.

Why would adding potato increase the amount of biogas produced?

[1 mark]

Tick (✓) **one** box.

The potato contains a lot of carbohydrate. ☐

The potato contains a lot of protein. ☐

The potato contains a lot of water. ☐

4

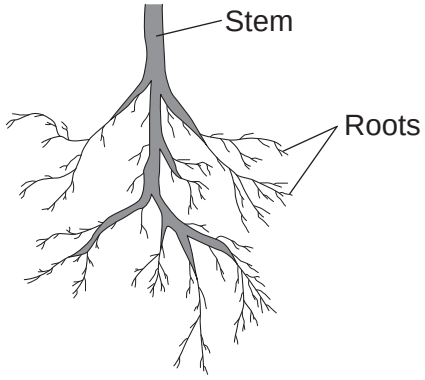
Turn over for the next question

Do not write outside the box

5 Plants need different substances to survive.

Figure 4 shows the roots of a plant.

Figure 4



5 (a) (i) Mineral ions are absorbed through the roots.

Name **one** other substance absorbed through the roots.

[1 mark]

.....

5 (a) (ii) The plant in **Figure 4** has a higher concentration of mineral ions in the cells of its roots than the concentration of mineral ions in the soil.

Which **two** statements correctly describe the absorption of mineral ions into the plant's roots?

[2 marks]

Tick (✓) **two** boxes.

The mineral ions are absorbed by active transport. ☐

The mineral ions are absorbed by diffusion. ☐

The mineral ions are absorbed down the concentration gradient. ☐

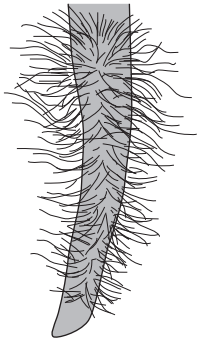
The absorption of mineral ions needs energy. ☐

Do not write outside the box

5 (a) (iii) The plant in **Figure 4** has roots adapted for absorption.

Figure 5 shows a magnified part of a root from **Figure 4**.

Figure 5



Describe how the root in **Figure 5** is adapted for absorption.

[2 marks]

.....

.....

.....

.....

5 (b) The leaves of plants have stomata.

What is the function of the stomata?

[1 mark]

.....

.....

Question 5 continues on the next page

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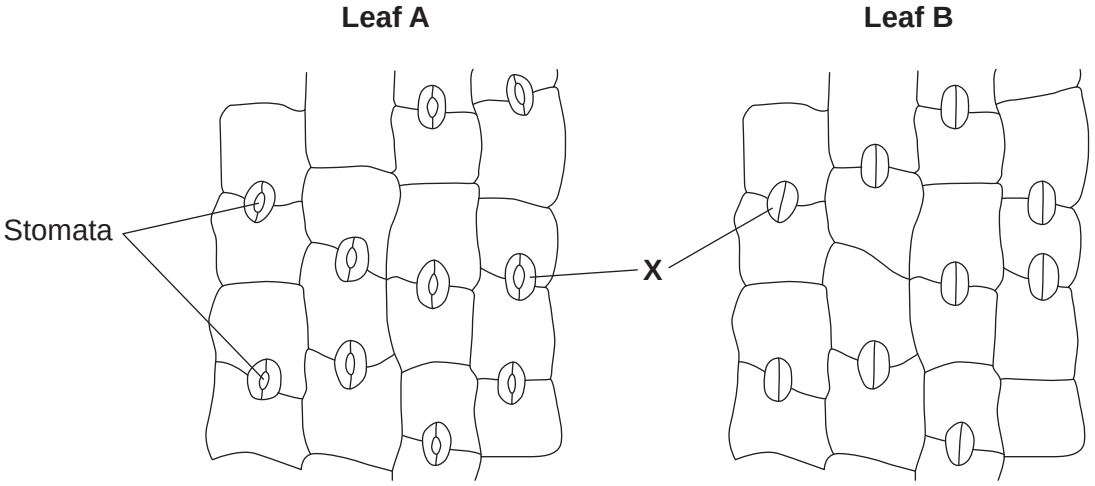
5 (c) **Figure 6** shows the underside of two leaves, **A** and **B**, taken from a plant in a man's house.

Figure 6



5 (c) (i) In **Figure 6**, the cells labelled **X** control the size of the stomata.

What is the name of the cells labelled **X**?

[1 mark]

Tick (✓) **one** box.

Guard cells ☐

Phloem cells ☐

Xylem cells ☐

5 (c) (ii) Describe how the appearance of the stomata in leaf **B** is different from the appearance of the stomata in leaf **A**.

[1 mark]

.....

.....

5 (c) (iii) The man forgets to water the plant.

What might happen to the plant in the next few days if the stomata stay the same as shown in leaf **A** in **Figure 6**?

[1 mark]

.....

.....

9

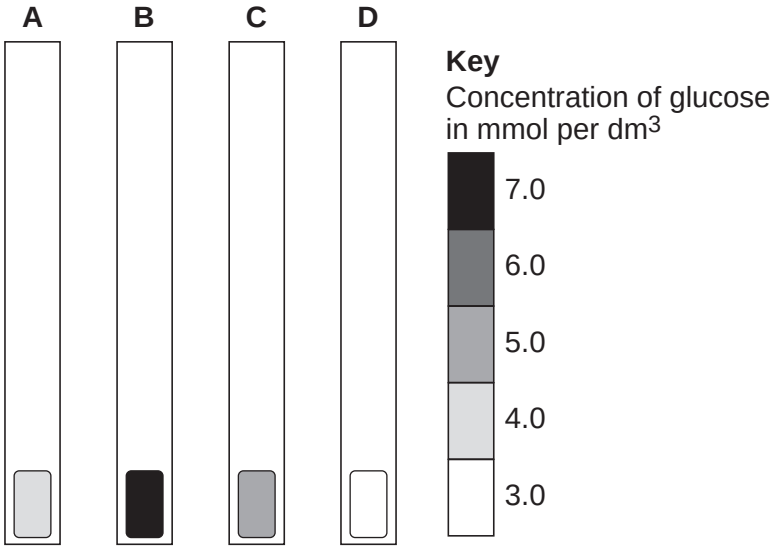
Do not write outside the box

6 Blood glucose concentration in humans must be kept between 4.4 and 6.1 mmol per dm^3.

Four students, **A**, **B**, **C** and **D**, tested their blood glucose concentration with glucose testing strips.

Figure 7 shows the results of their tests and the key from the test strip bottle.

Figure 7



6 (a) (i) Which student, **A**, **B**, **C** or **D**, has diabetes and has eaten a large piece of cake?

[1 mark]

6 (a) (ii) Which student, **A**, **B**, **C** or **D**, is in most need of eating carbohydrates?

[1 mark]

6 (a) (iii) Which student, **A**, **B**, **C** or **D**, has a healthy blood glucose concentration?

[1 mark]

6 (b) (i) Name the hormone that people with diabetes inject to prevent their blood glucose concentration from becoming too high.

[1 mark]

.....

6 (b) (ii) Blood glucose concentration is monitored in the body.

Which organ monitors blood glucose concentration?

Draw a ring around the correct answer.

[1 mark]

brain **liver** **pancreas**

5

Do not write outside the box

7 The world population is increasing and the need for food is increasing.

Mycoprotein is a high-protein food made in fermenters using the organism *Fusarium*.

The process takes only a few weeks to produce a large amount of food.

7 (a) (i) What type of organism is *Fusarium*?

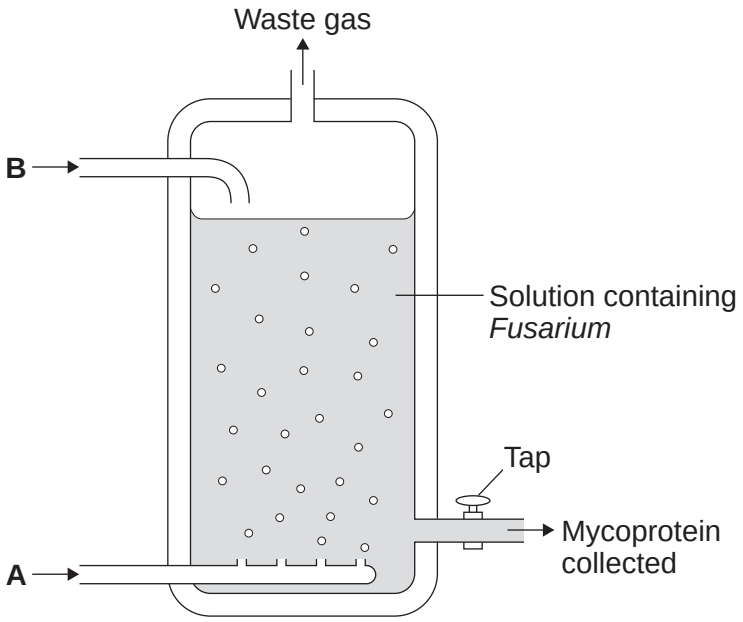
Draw a ring around the correct answer.

[1 mark]

bacterium **fungus** **virus**

Figure 8 shows a fermenter used in mycoprotein production.

Figure 8



7 (a) (ii) *Fusarium* makes mycoprotein. *Fusarium* respires aerobically.

Suggest which gas is added to the fermenter at point **A**.

[1 mark]

.....

7 (a) (iii) Another substance is added to the fermenter at point **B**. This substance is used in aerobic respiration.

Name this substance.

[1 mark]

.....

Do not write outside the box

7 (b) People need to eat protein to grow and to be healthy.

Some people think that it would be an advantage to get more food from mycoprotein and less from farming animals.

Suggest **two** possible advantages of getting more food from mycoprotein.

[2 marks]

1 .....

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2 .....

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5

Turn over for the next question

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8 The circulatory system transports substances such as glucose and oxygen around the body.

8 (a) Name **two** other substances that the circulatory system transports around the body.

[2 marks]

1 .....

2 .....

8 (b) (i) Blood is a tissue. Blood contains red blood cells and white blood cells.

Name **two** other components of blood.

[2 marks]

1 .....

2 .....

8 (b) (ii) The heart is part of the circulatory system.

What type of tissue is the wall of the heart made of?

[1 mark]

.....

Question 8 continues on the next page

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

Every year, many patients need to have heart valve replacements.

Figure 9 gives information about two types of heart valve.

Figure 9

Living human heart valve	Cow tissue heart valve
• It has been used for transplants for more than 12 years. • It can take many years to find a suitable human donor. • It is transplanted during an operation after a donor has been found. • During the operation, the patient's chest is opened and the old valve is removed before the new valve is transplanted.	• It has been used since 2011. • It is made from the artery tissue of a cow. • It is attached to a stent and inserted inside the existing faulty valve. • A doctor inserts the stent into a blood vessel in the leg and pushes it through the blood vessel to the heart.

A patient needs a heart valve replacement. A doctor recommends the use of a cow tissue heart valve.

Give the advantages and disadvantages of using a cow tissue heart valve compared with using a living human heart valve.

Use information from **Figure 9** and your own knowledge in your answer.

[6 marks]

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Extra space .....

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11

Turn over for the next question

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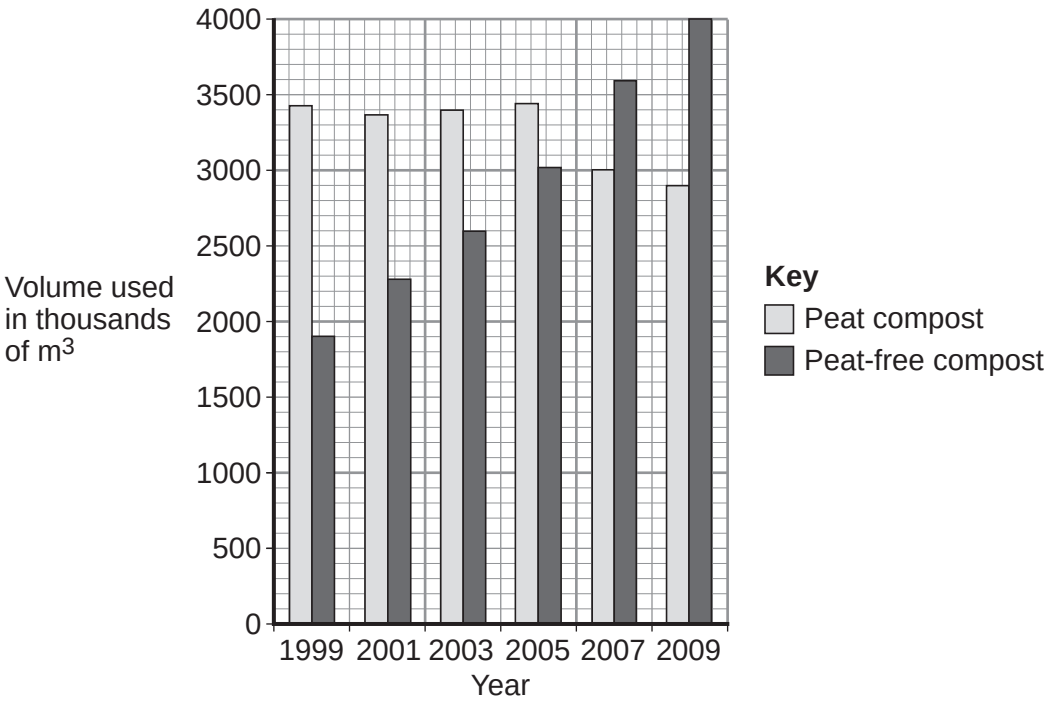
9 Human activities have many effects on our ecosystem.

Figure 10 shows the volume of peat compost and peat-free compost used in gardening from 1999 to 2009.

Figure 10



9 (a) Describe the trends shown in **Figure 10**.

[2 marks]

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9 (b) What effect does the destruction of peat bogs have on the gases in the atmosphere?

[1 mark]

.....

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9 (c) Deforestation is also damaging ecosystems.

Describe **one** effect of deforestation on ecosystems.

[1 mark]

.....

.....

4

END OF QUESTIONS

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