Q1. A gardener wants to add compost to the soil to increase his yield of strawberries.

The gardener wants to make his own compost.

(a) An airtight compost heap causes anaerobic decay.

Explain why the gardener might be against producing compost using this method.

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(2)

(b) The gardener finds this research on the Internet:

'A carbon to nitrogen ratio of 25:1 will produce fertile compost.'

Look at the table below.

Type of material to compost	Mass of carbon in sample in g	Mass of nitrogen in sample in g	Carbon:nitrogen ratio
Chicken manure	8.75	1.25	7:1
Horse manure	10.00	0.50	20:1
Peat moss	9.80	0.20	**X**

Determine the ratio **X** in the table above.

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Ratio .....

(1)

(c) Which type of material in the table above would be **best** for the gardener to use to make his compost?

Justify your answer.

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(1)

(d) Some of the leaves from the gardener's strawberry plant die.

The dead leaves fall off the strawberry plant onto the ground.

The carbon in the dead leaves is recycled through the carbon cycle.

Explain how the carbon is recycled into the growth of new leaves.

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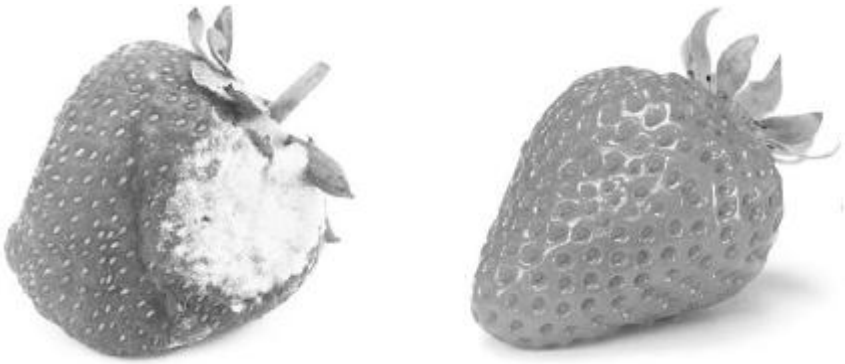
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(6)

(e) The diagram below shows two strawberries.

- Both strawberries were picked from the same strawberry plant.
- Both strawberries were picked 3 days ago.
- The strawberries were stored in different conditions.

Strawberry A **Strawberry B**



A © sarahdoow/iStock/Thinkstock, B © Mariusz Vlack/iStock/Thinkstock

Give **three** possible reasons that may have caused strawberry **A** to decay.

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2 .....

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3 .....

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(3)
(Total 13 marks)

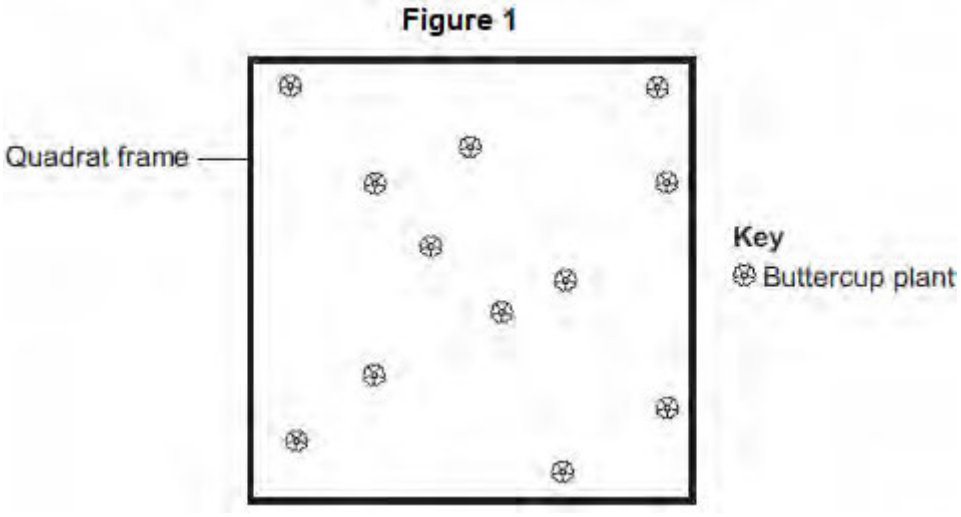
Q2.A grassy field on a farm measured 120 metres by 80 metres.

A student wanted to estimate the number of buttercup plants growing in the field.

The student found an area where buttercup plants were growing and placed a 1 m × 1 m quadrat in one position in that area.

Figure 1 shows the buttercup plants in the quadrat.

Figure 1



The student said, 'This result shows that there are 115 200 buttercup plants in the field.'

(a) (i) How did the student calculate that there were 115 200 buttercup plants in the field?

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(2)

(ii) The student's estimate of the number of buttercup plants in the field is probably not accurate. This is because the buttercup plants are not distributed evenly.

How would you improve the student's method to give a more accurate estimate?

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(2)

(b) Sunlight is one environmental factor that might affect the distribution of the buttercup plants.

(i) Give **three other** environmental factors that might affect the distribution of the buttercup plants.

1.....

2.....

3.....

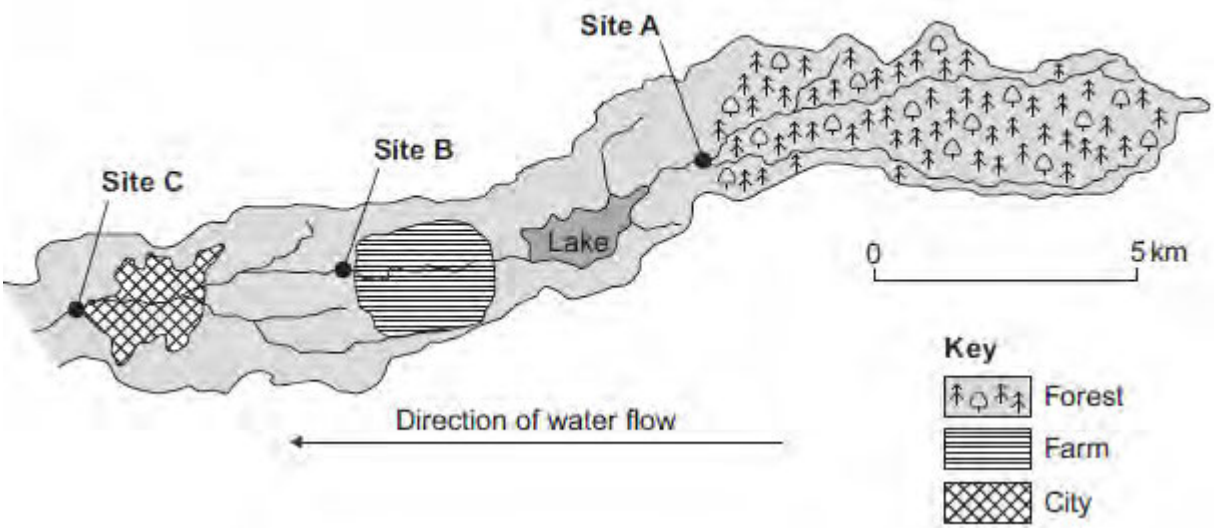
(3)

(ii) Explain how the amount of sunlight could affect the distribution of the buttercup plants.

(3)

(c) **Figure 2** is a map showing the position of the farm and a river which flows through it.

Figure 2



Every year, the farmer puts fertiliser containing mineral ions on some of his fields.When there is a lot of rain, some of the fertiliser is washed into the river.

(i) When fertiliser goes into the river, the concentration of oxygen dissolved in the water decreases.

Explain why the concentration of oxygen decreases.

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(5)

(ii) There is a city 4 km downstream from the farm.

Apart from fertiliser, give **one** other form of pollution that might go into the river as it flows through the city.

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(1)

(d) Three sites, **A**, **B** and **C**, are shown in **Figure 2**.

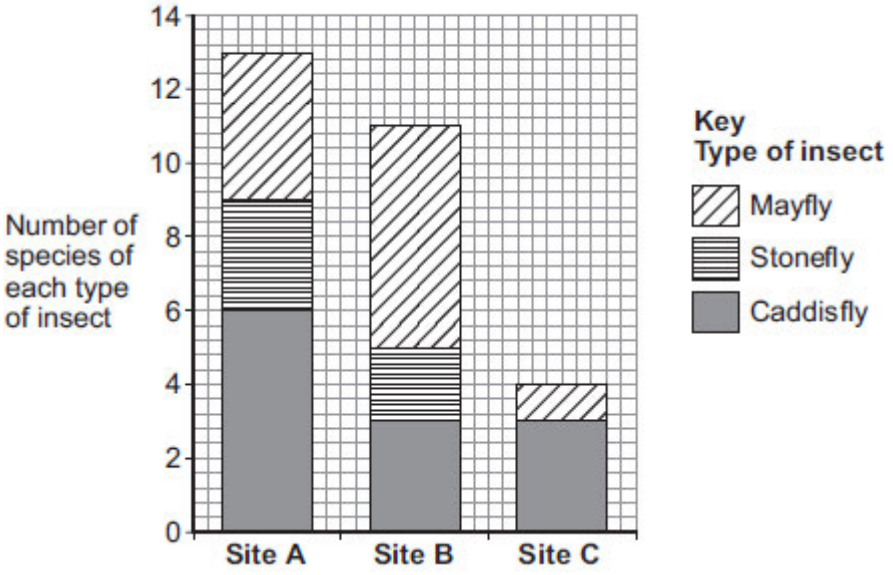
Scientists took many samples of river water from these sites.

The scientists found larvae of three types of insect in the water: mayfly, stonefly and caddisfly. For each type of insect the scientists found several different species.

The scientists counted the number of different species of the larvae of each of the three types of insect.

Figure 3 shows the scientists' results.

Figure 3



(i) How many more species of mayfly were there at Site **B** than at Site **A**?

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(1)

(ii) Suggest what caused this increase in the number of species of mayfly.

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(1)

(iii) The scientists stated that the number of species of stonefly was the best indicator of the amount of oxygen dissolved in the water.

Use information from **Figure 3** to suggest why.

(1)

(Total 19 marks)

Q3. In many areas of the world the mass of household waste produced each year is increasing.

(a) Give **two** reasons why the mass of household waste is increasing each year.

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2.....

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(2)

(b) The table below shows how the mass of household waste in the UK has changed from 2004 to 2012.

Year	Total mass of household waste in thousands of tonnes (including total household recycling)	Total mass of household recycling in thousands of tonnes	Percentage of household waste recycled
2004	25 658	5785	22.5
2006	25 775	7976	30.9
2008	24 334	9398	38.6
2010	23 454	9733	
2012	22 643	9782	43.2

(i) Calculate the percentage of household waste recycled in 2010.

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..... %

(2)

(ii) The UK government has been encouraging a 'zero waste economy'.

In a ‘zero waste economy’, we reduce, reuse and recycle as much waste as possible.

A newspaper concluded that: **‘The government’s ‘zero waste economy’ has been successful.’**

Use information from the table to describe the reasons for and against the newspaper’s conclusion.

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(4)

(c) (i) Some waste releases carbon dioxide and methane into the atmosphere. An increase in carbon dioxide and methane contributes to global warming.

Global warming can cause sea levels to rise.

Describe **two** other possible effects of global warming on our environment.

1.....

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2.....

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(2)

(ii) Storing the carbon dioxide helps to prevent more global warming. Carbon dioxide can be stored (sequestered) in trees when they photosynthesise.

Give **one** different way in which carbon dioxide is sequestered in our environment.

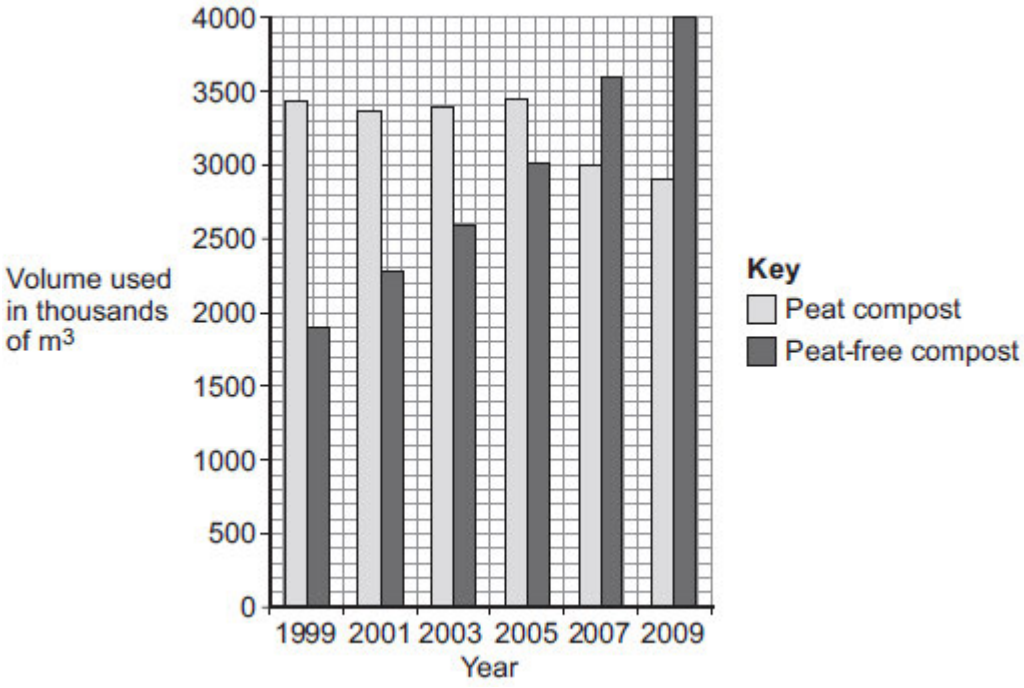
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(1)
(Total 11 marks)

Q4. Human activities have many effects on our ecosystem.

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



(a) Describe the trends shown in the graph.

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(2)

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

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(1)

(c) Deforestation is also damaging ecosystems.

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

(1)
(Total 4 marks)