

Q1. In compost heaps, dead plants are broken down by microbes.
This breakdown is much slower:

- when the weather is cold
- when the weather is dry
- when the heap is squashed down so that no air can circulate.

(a) What **three** conditions inside compost heaps are needed for microbes to work **quickly**?

- 1
- 2
- 3

(3)

(b) Why is the breakdown of dead plants important for living plants?

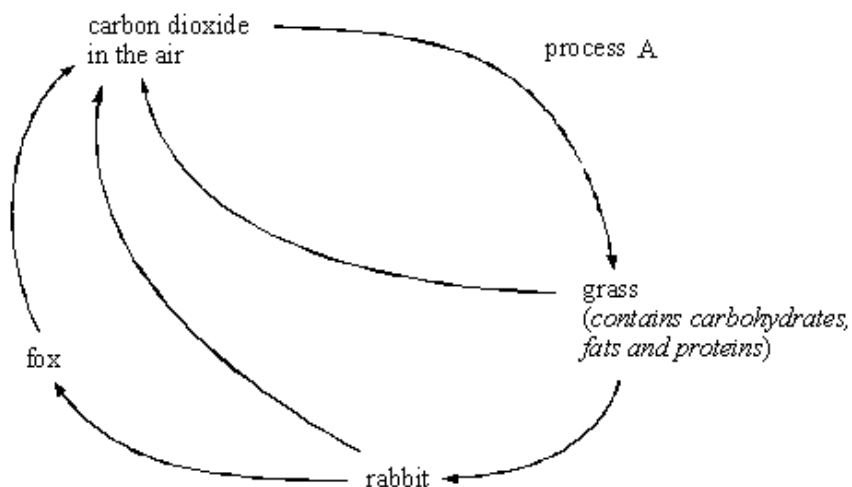
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(1)

(Total 4 marks)

Q2. The diagram shows part of the carbon cycle.



(a) Write down the name given to process A.

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(1)

- (b) Explain, as fully as you can, how some of the carbon in the grass becomes part of the fox's body.

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(3)
(Total 4 marks)

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- (a) Use words from the box to complete the sentences about the water cycle.

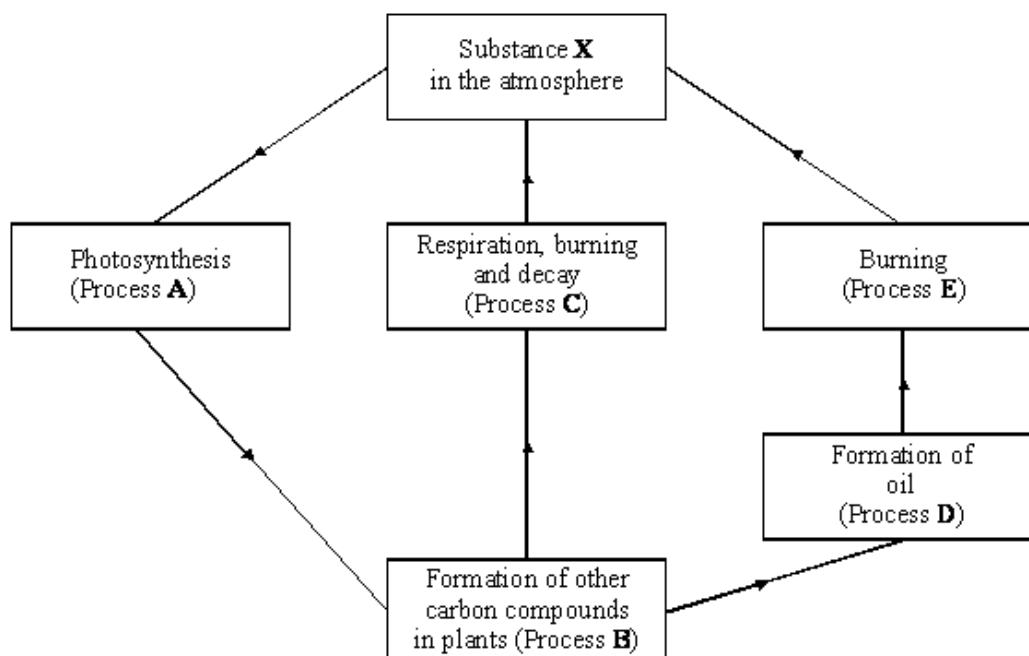
boils	condenses	evaporates	freezes
melts	rain	sea	Sun
		wind	

Water from the surface of the Heat from the speeds up this process and so does the

Water vapour in the atmosphere cools down and to form billions of tiny water droplets. Some of the droplets join together and fall as

(6)

- (b) The diagram shows some processes in the carbon cycle.



(i) What is the name of substance **X**?

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(1)

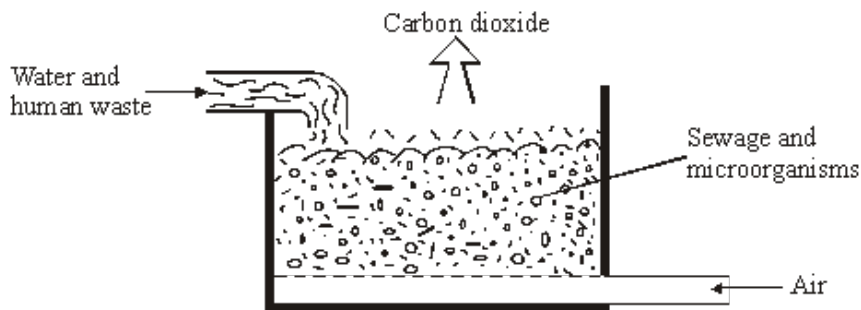
(ii) Which process, **A**, **B**, **C**, **D** or **E**, takes the **longest** and approximately how long does it take?

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(2)

(Total 9 marks)

Q4. In a sewage works, human waste is broken down by microorganisms. Air is blown through this sewage.



To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

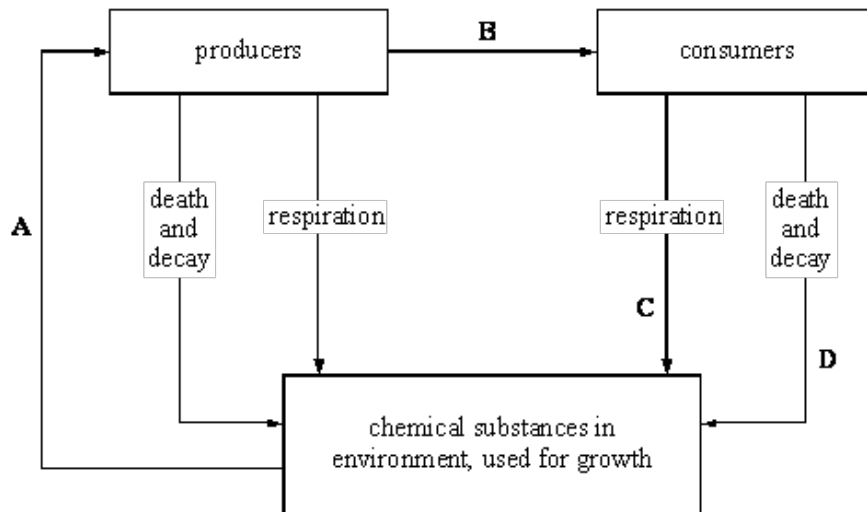
Carbon dioxide is formed from the mixture of sewage, microorganisms and air. Explain how.

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(3)

(Total 3 marks)

Q5. The diagram shows some of the stages by which materials are cycled in living organisms.

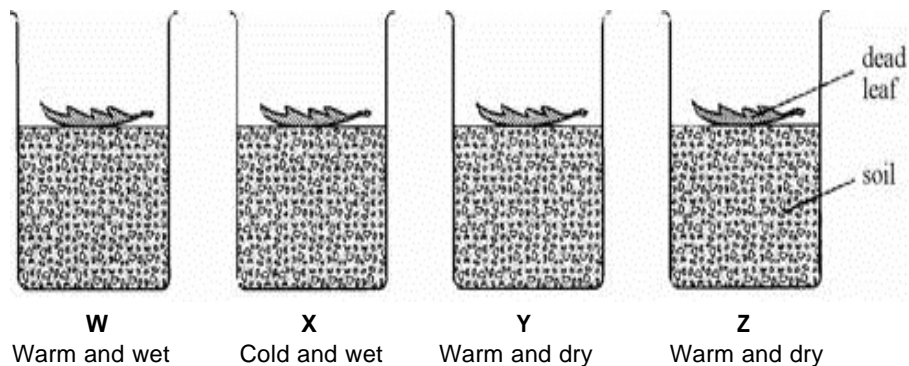


(a) In which of the stages, **A**, **B**, **C** or **D**:

- (i) are substances broken down by microbes;
- (ii) is carbon dioxide made into sugar;
- (iii) are plants eaten by animals?

(3)

(b) In an experiment, samples of soil were put into four beakers. A dead leaf was put onto the soil in each beaker. The soil was kept in the conditions shown.



In which beaker, **W**, **X**, **Y** or **Z**, would the dead leaf decay quickest?

(1)

(Total 4 marks)

Q6. (a) One food chain in the wood is:

Hazel tree nuts → squirrels → owls

(i) What does this food chain tell us?

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(2)

(ii) Which **one** of the organisms in the food chain is a producer?

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(1)

(iii) This year the hazel bushes have produced very few nuts.

Explain, as fully as you can, how this might affect the populations of:

1. squirrels;

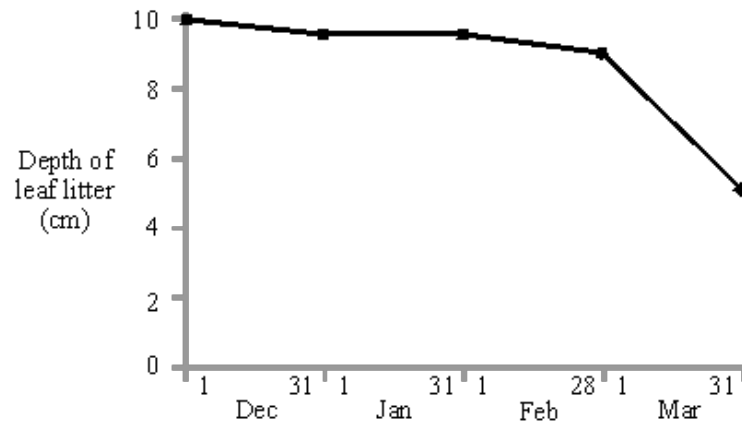
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2. owls.

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(4)

- (b) An area of the floor of the wood 1 m² was fenced off so that animals could not reach it. The graph below shows the depth of leaf litter (dead leaves) inside the fence over the next few months.



Explain, as fully as you can,

- (i) why the depth of the leaf litter decreased;

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(1)

- (ii) how this decrease happened.

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(1)

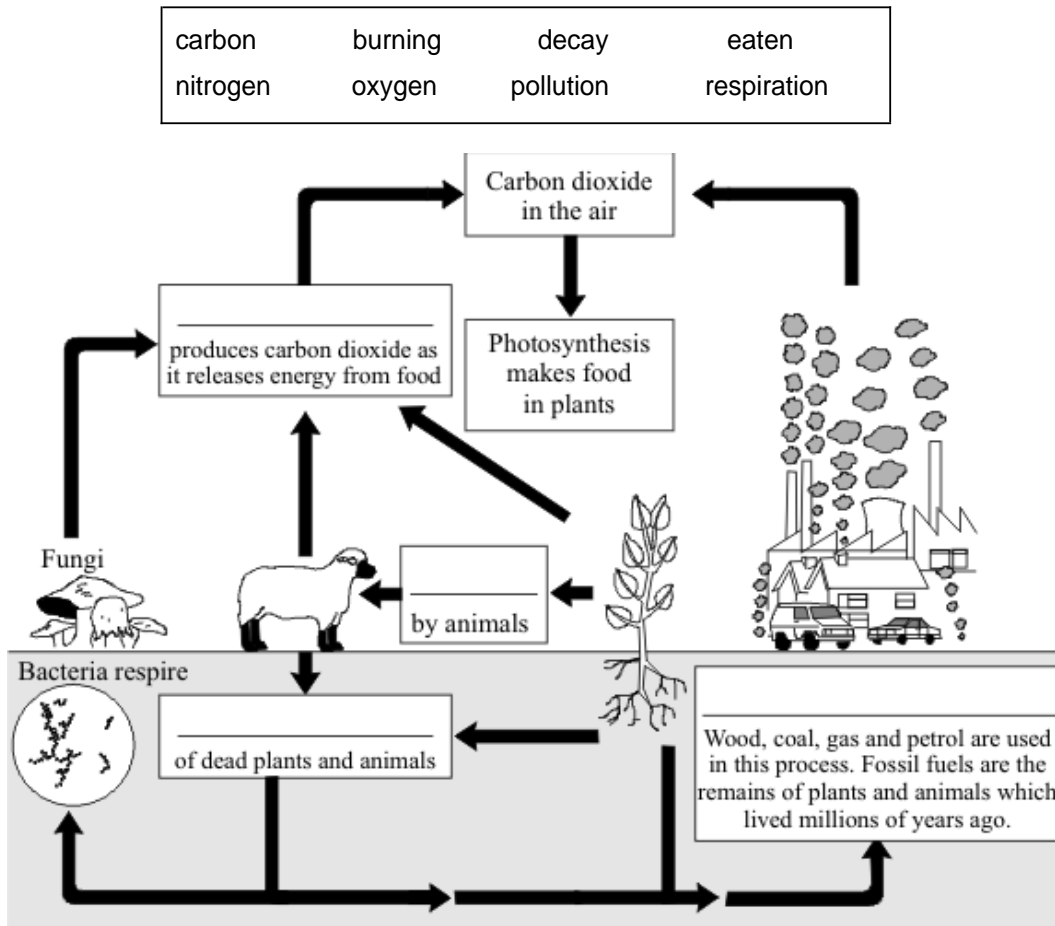
- (iii) In which month does leaf litter disappear fastest? Explain why.

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(2)

(Total 11 marks)

- Q7. (a) Use the words in the box to fill in the gaps in the diagram. You may use each word once or not at all.



(4)

- (b) (i) Why are fungi called decomposers?

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(1)

- (ii) Give **one** other type of decomposer.

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(1)

(Total 6 marks)

Q8. Each autumn, many trees lose their leaves.

- (a) Describe how carbon compounds in the leaves can be recycled so that they can be used again by the trees.

To gain full marks in this question you should write your ideas in good English. Put them into a sensible order and use the correct scientific words.

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(4)

- (b) Give **two** environmental conditions which speed up the processes that you have described in part (a).

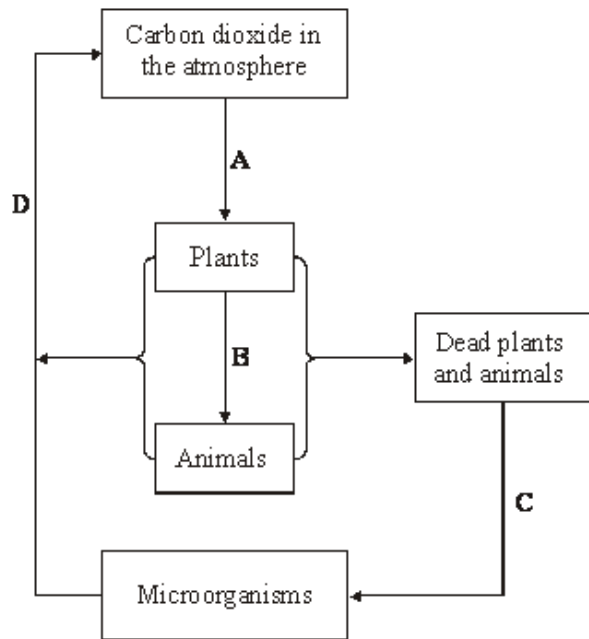
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2

(2)

(Total 6 marks)

Q9. The diagram shows part of the carbon cycle.



(a) Which letter, **A**, **B**, **C** or **D**, represents:

(i) respiration

(1)

(ii) photosynthesis?

(1)

(b) Local authorities are encouraging people to recycle vegetable waste by converting it into compost.

Compost is made by mixing the vegetable waste with soil in a large container.

(i) Decay occurs more quickly if the container has holes in the sides.

Explain why.

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(2)

- (ii) Spreading compost on the soil between plants leads to better growth of the plants.

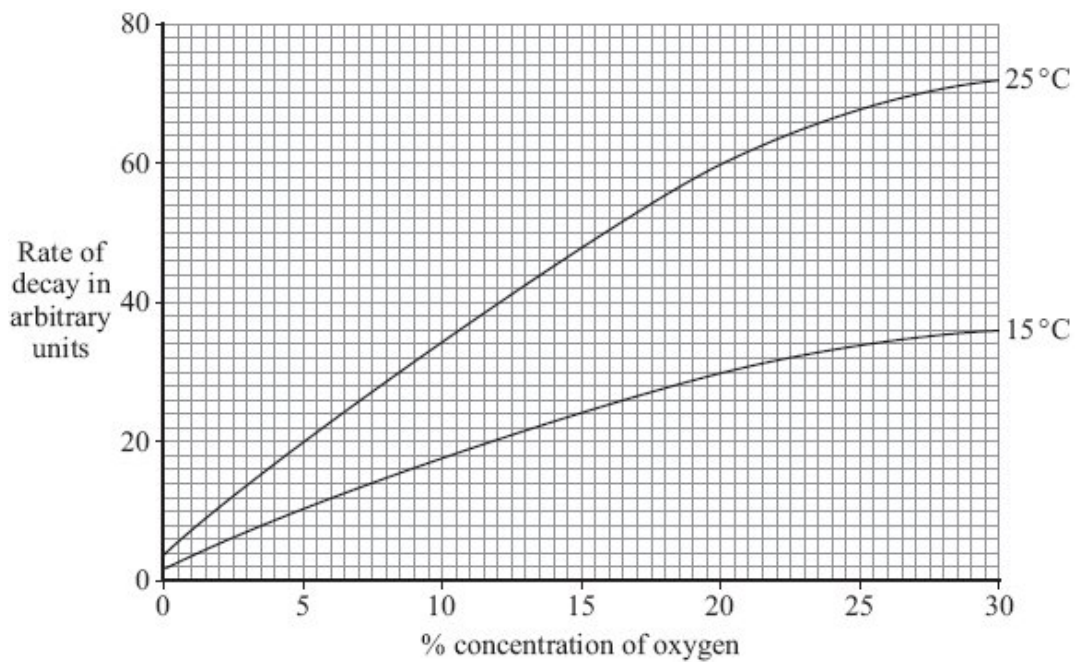
Explain why.

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(1)
(Total 5 marks)

Q10. Gardeners often put waste materials onto compost heaps.

The graph shows how the conditions in a compost heap affect how quickly waste materials in the heap decay.

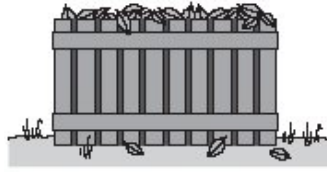


- (a) (i) Describe the effect of increasing the temperature from 15 °C to 25 °C on the rate of decay at 20 % oxygen concentration.

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(2)

- (ii) Gardeners are advised to put waste materials into special compost bins. These bins have holes in their sides.



Holes in the sides of the compost bin help the waste materials to decay faster.

Explain why.

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(2)

- (b) A gardener noticed that some of his plants were growing poorly.

He put some decayed compost onto the soil, around the plants.
Six months later the plants were growing well.

Explain why.

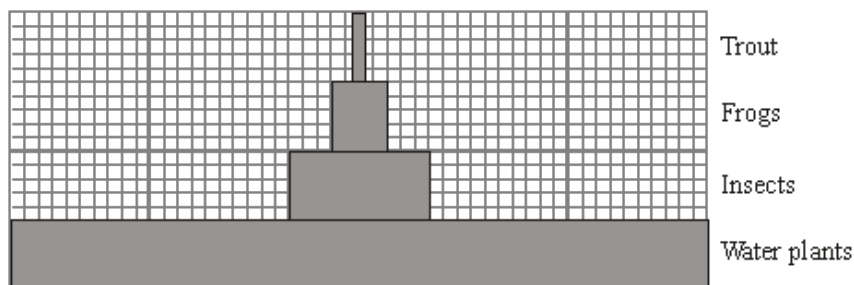
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(1)

(Total 5 marks)

- Q11.** The diagram shows a pyramid of biomass drawn to scale.



- (a) What is the source of energy for the water plants?

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(1)

- (b) The ratio of the biomass of water plants to the biomass of insects is 5 : 1.

Calculate the ratio of the biomass of insects to the biomass of frogs.

Show clearly how you work out your answer.

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ratio = : 1

(2)

- (c) Give **two** reasons why the biomass of the frog population is smaller than the biomass of the insect population.

1
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2
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(2)

- (d) Some insects die.

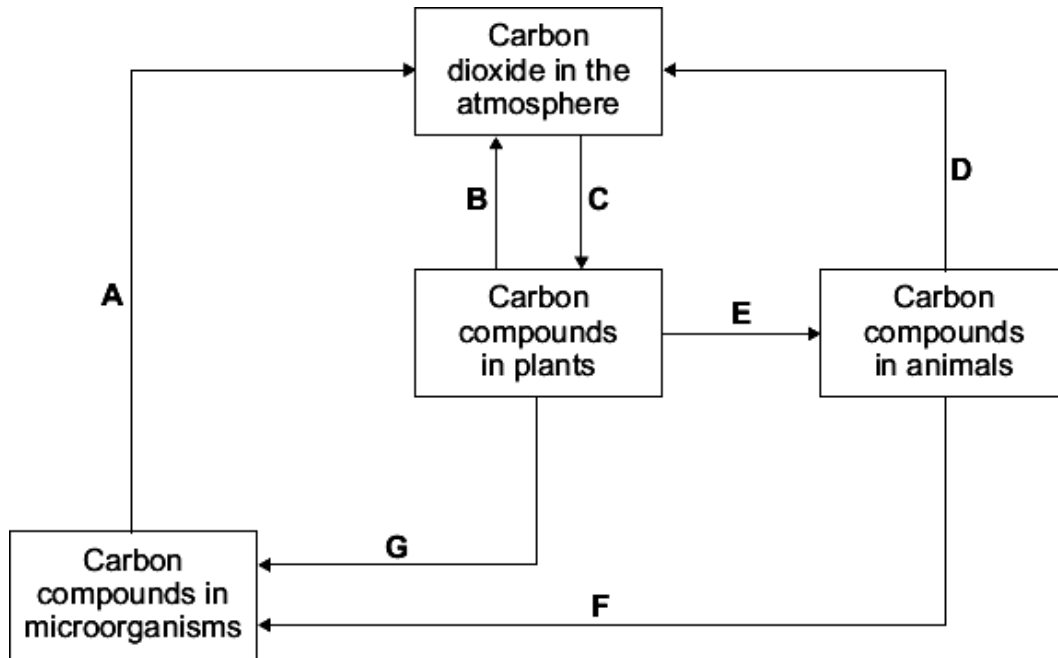
Describe how the carbon in the dead insect bodies may be recycled.

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(4)

(Total 9 marks)

Q12. The diagram shows part of the carbon cycle.



(a) Letter **A** represents respiration.

Which **two** other letters represent respiration?

and

(1)

(b) Other than carbon dioxide name **two** carbon compounds found in plants.

1

2

(2)

(c) Gardeners use compost heaps to decay dead plants. Decayed compost is then spread onto the soil in a garden.

Explain why gardeners spread decayed compost onto the soil.

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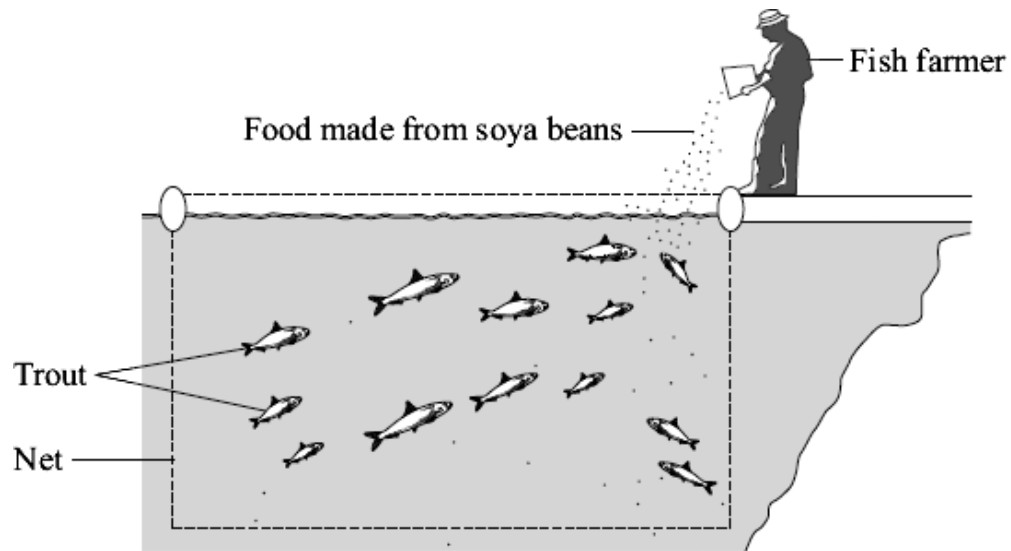
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(2)

(Total 5 marks)

Q13. A fish farmer keeps trout in a large net in a lake.



The fish farmer feeds the trout on food made from soya beans.

When the trout are large enough the farmer sells them for food for people.

(a) Draw a pyramid of biomass for the three organisms in this food chain.

Label the pyramid.

(2)

- (b) It would be more energy efficient if people ate the soya beans rather than eating the trout.

Which **two** of the following are reasons for this?

Tick (✓) **two** boxes.

Some people do not like eating animals such as trout.

☐

The trout release energy when they respire.

☐

Soya bean plants release energy when they respire.

☐

Some energy will be lost in waste from the trout.

☐

Soya bean plants absorb energy during photosynthesis.

☐

(2)

- (c) Suggest **one** advantage to the fish farmer of keeping the trout in a large net instead of letting them swim freely in the lake.

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(1)

- (d) Some trout die before they are large enough to be sold.
The dead trout contain carbon.

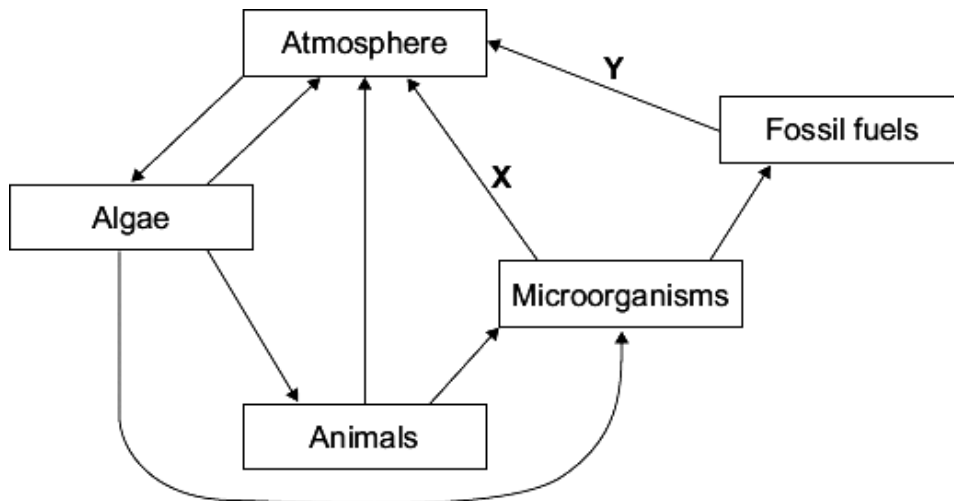
Use your knowledge of the carbon cycle to describe how this carbon is returned to the atmosphere after the trout die.

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(2)

(Total 7 marks)

Q14. The diagram shows part of a carbon cycle in a habitat.



(a) Name the processes shown by arrows **X** and **Y**.

X

Y

(2)

(b) Describe the part played by algae in this carbon cycle.

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(3)

(c) In tropical rainforests process **X** is much faster than in most other habitats.

Suggest why.

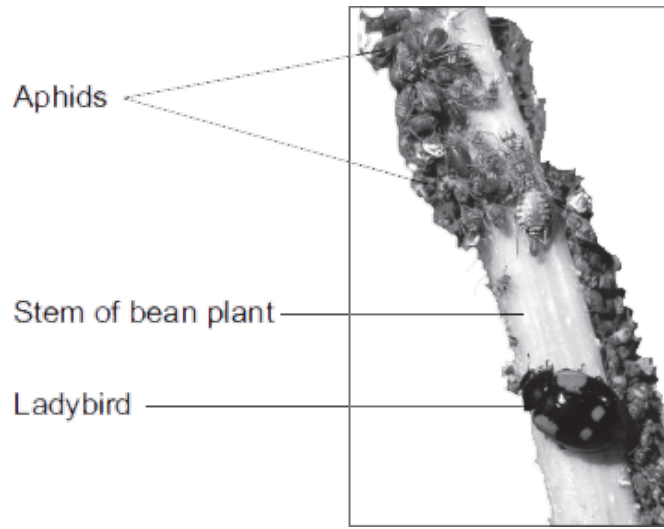
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(2)

(Total 7 marks)

Q15. Students investigated a food chain in a garden.

The students found 650 aphids feeding on one bean plant.
Five ladybirds were feeding on the aphids.



Photograph supplied by Hemera/Thinkstock

- (a) (i) Draw a pyramid of biomass for this food chain.
Label the pyramid.

(2)

- (ii) The biomass in the five ladybirds is less than the biomass in the bean plant.

Give **two** reasons why.

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(2)

- (b) The carbon in dead bean plants is returned to the atmosphere via the carbon cycle.

Describe this part of the carbon cycle.

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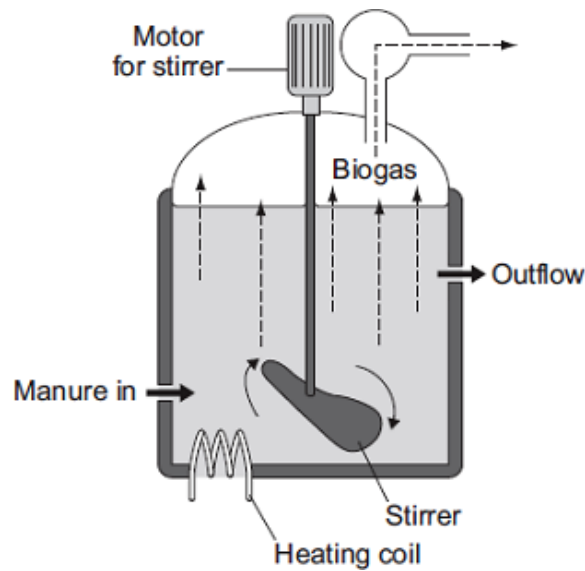
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(4)
(Total 8 marks)

- Q16.** The diagram shows one type of *anaerobic* digester. The digester is used to produce biogas.



- (a) (i) What does *anaerobic* mean?

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(1)

- (ii) The concentration of solids that are fed into this digester must be kept very low.

Suggest **one** reason why.

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(1)

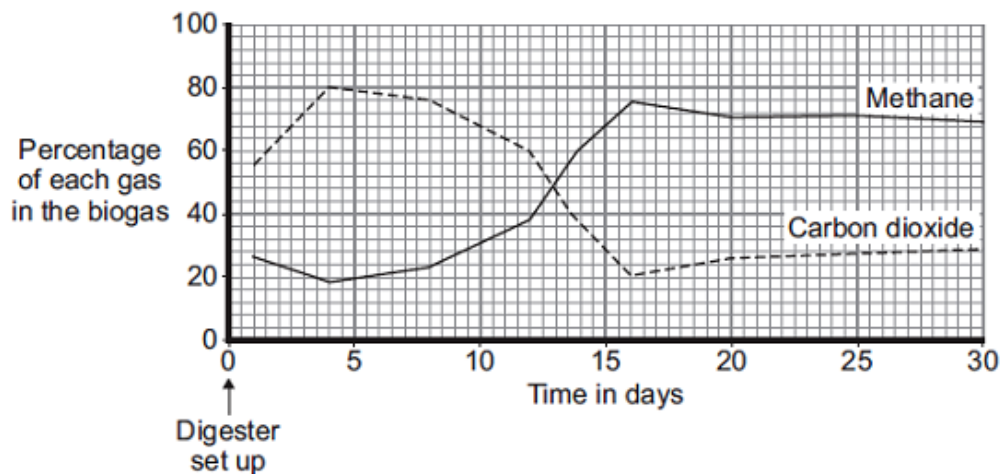
- (iii) This digester is more expensive to run than some other simpler designs of biogas generator.

Suggest **one** reason why.

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(1)

- (b) The graph shows how the composition of the biogas produced by the digester changed over the first 30 days after the digester was set up.



Use information from the graph to answer the following questions.

- (i) Describe how the percentage of carbon dioxide changed over the 30 days.

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(3)

- (ii) On which day was the best quality biogas produced?

(1)

- (c) Four days after the digester was first set up, the biogas contained a high percentage of carbon dioxide.

Suggest an explanation for this.

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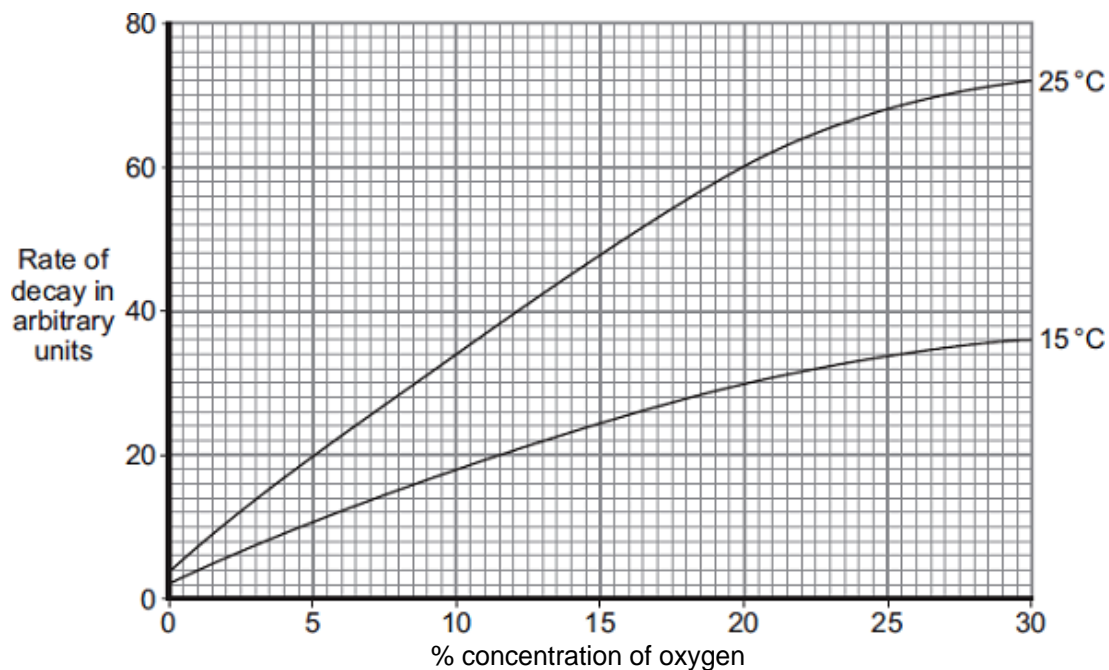
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(2)
(Total 9 marks)

Q17. Gardeners often put waste material onto compost heaps.

The graph shows how the conditions in a compost heap affect how quickly waste material in the compost heap decays.



- (a) (i) Describe the effect of increasing the temperature from 15°C to 25°C on the rate of decay at 20% oxygen concentration.

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(2)

- (ii) Gardeners are advised to put waste materials into special compost bins. These bins have holes in their sides.



Holes in the sides of the compost bin help the waste materials to decay faster.

Explain why.

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(2)

- (b) A gardener noticed that some of his plants were growing poorly.

The gardener put some decayed compost onto the soil, around the plants. One month later the plants were growing well.

Explain why.

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(1)

(Total 5 marks)

Q18. Deforestation affects the environment in many ways.

- (a) Deforestation increases the amount of carbon dioxide in the atmosphere.

Give **two** reasons why.

1

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2

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(2)

(b) Deforestation also results in a loss of *biodiversity*.

(i) What is meant by *biodiversity*?

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(1)

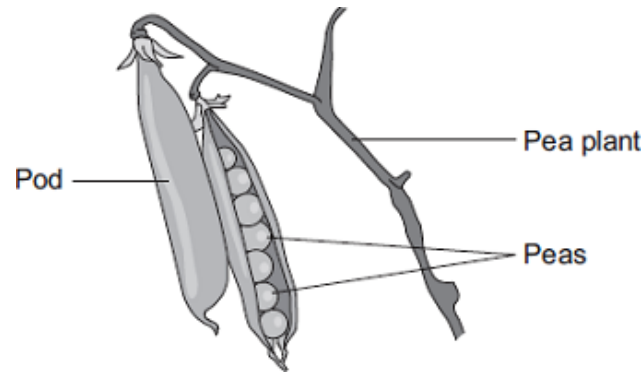
(ii) Give **two** reasons why it is important to prevent organisms becoming extinct.

1
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2
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(2)

(Total 5 marks)

Q19. Peas grow in pods on pea plants.



A gardener grew four varieties of pea plants, **A** , **B** , **C** and **D** , in his garden.
The gardener counted the number of peas in each pod growing on each plant.

The table shows his results.

Variety	Range of number of peas in each pod	Mean number of peas in each pod
A	2–6	4
B	3–7	5
C	3–8	6
D	6–8	7

- (a) Give **one** environmental factor and **one other** factor that might affect the number of peas in a pod.

Environmental factor.....

Other factor.....

(2)

- (b) The gardener thinks that he will get the largest mass of peas from his garden if he grows variety **D**.

Why is the gardener **not** correct?

Suggest **one** reason.

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(1)

- (c) It is important that carbon is cycled through living things.

After he has picked the peas, the gardener puts the dead pea plants onto a compost heap.

Over the next few months, the carbon in the carbon compounds from the pea plants is returned to the air.

Describe how.

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(4)
(Total 7 marks)

