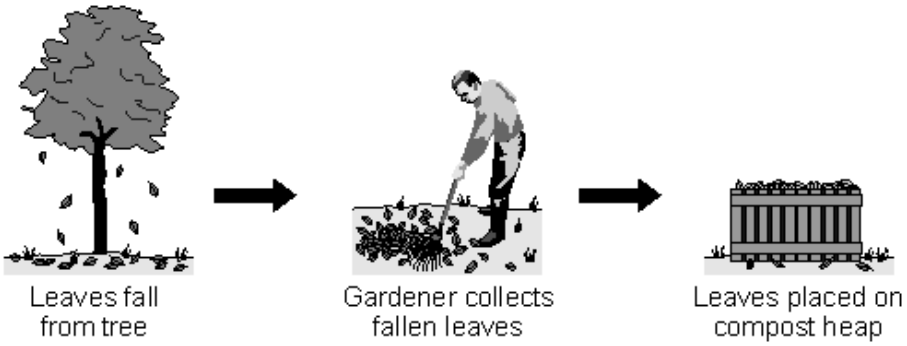
Q1. Gardeners often collect fallen leaves in autumn and place them on compost heaps.



(a) Over the next year the leaves decay.

Which living things cause leaves to decay?

.....

.....

(1)

(b) The leaves decay more quickly in summer than in winter.

Give **one** reason why.

.....

.....

(1)

(c) The compost heap has holes in its sides to allow gases to enter.

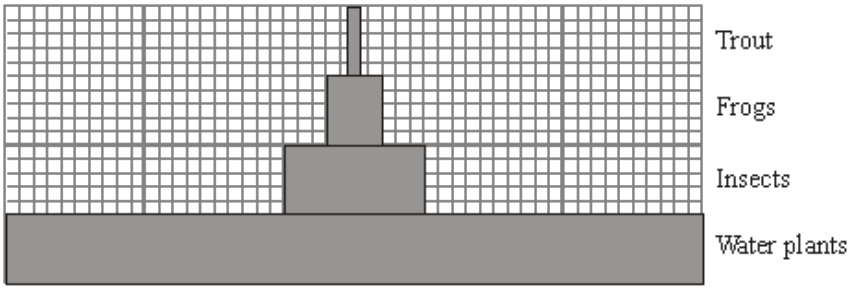
Which gas is needed for decay?

.....

.....

(1)
(Total 3 marks)

Q2. The diagram shows a pyramid of biomass drawn to scale.



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

.....

(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.

.....

.....

ratio = ... : 1

(2)

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

1 .....

.....

2 .....

.....

(2)

(d) Some insects die.

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

.....

.....

.....

.....

.....

.....

.....

.....

.....

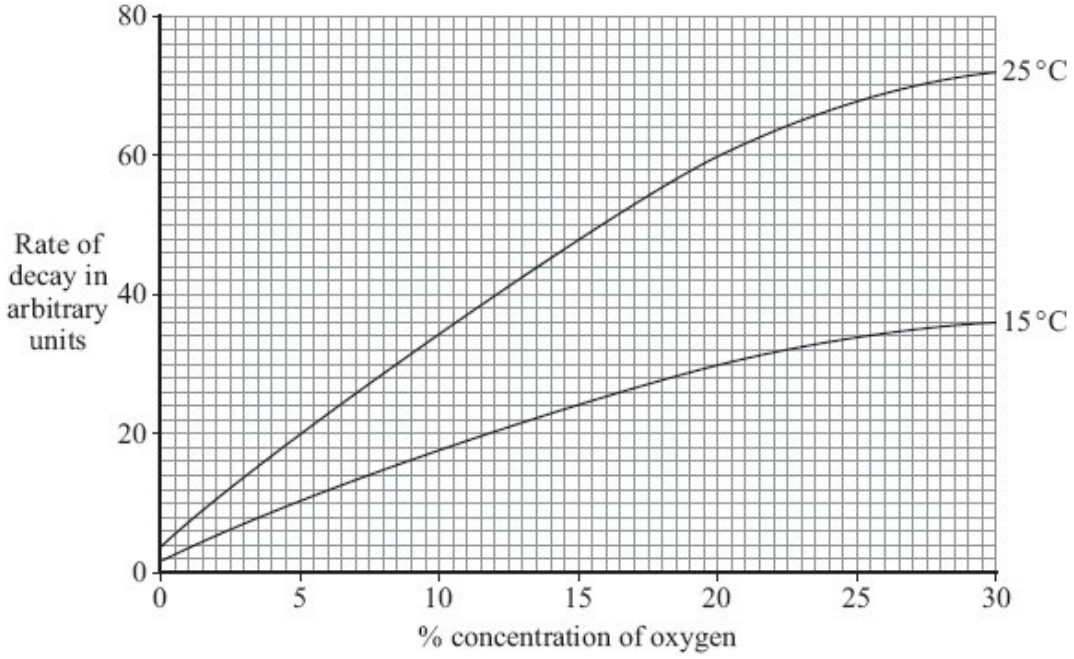
.....

(4)

(Total 9 marks)

Q3. 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.

.....

.....

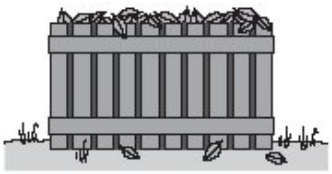
.....

.....

.....

(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.

.....

.....

.....

.....

.....

(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.

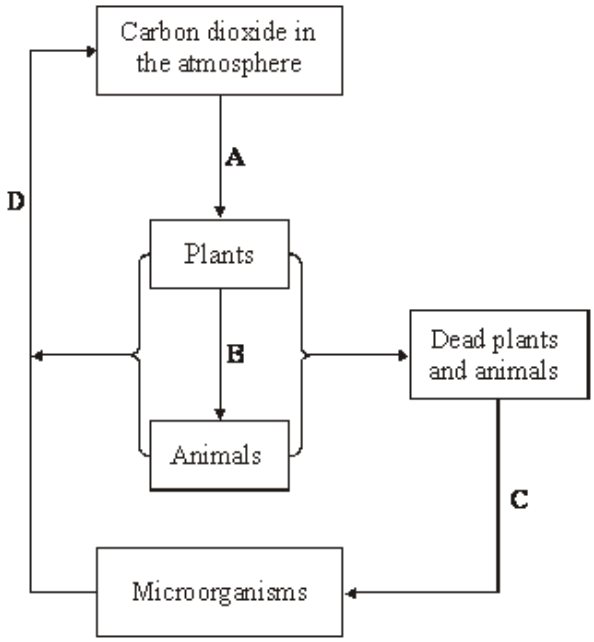
Explain why.

.....

.....

(1)
(Total 5 marks)

Q4. 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.

.....

.....

.....

.....

(2)

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

Explain why.

.....

.....

(1)

(Total 5 marks)

##

The diagram shows the flow of energy through a forest. The figures are in kilojoules of energy per square metre per year.

(a) What percentage of the energy in the trees is passed on as food for the carnivores? Show clearly how you work out your final answer.

.....

.....

..... per cent

(2)

(b) Give **three** reasons why so little of the energy in the trees is passed on to the carnivores.

1 .....

.....

2 .....

.....

3 .....

.....

(3)

(Total 5 marks)

M1. (a) microorganisms / bacteria / fungi / microbes

*allow named example **or** mould*

ignore decomposers unqualified / germs / maggots / worms

1

(b) it is warm(er) / hot / increased heat / increased temperature

ignore sun is hot unqualified

1

(c) oxygen

1

[3]

M2. (a) the sun / light / sunshine / solar

allow radiation <u>from the sun</u>

ignore photosynthesis / respiration

apply list principle

*do **not** allow water / minerals / heat*

1

(b) 2.5 (:1)

correct answer with or without working

ignore rounding with correct working

*do **not** allow other equivalent ratios for both marks*

*evidence of selection of 10(insects) **and** 4(frogs) **or** 50 **and** 20 **or** 1 **and** 0.4 for **1** mark*

if no other working allow **1** mark for 0.4:(1) on answer line

2

(c) any **two** from:

*allow for insects **or** frogs*

allow energy for biomass

- some parts indigestible / faeces
- waste / examples of waste eg urea / nitrogenous compounds / urine / excretion
- movement / eg of movement

  allow keeping warm
- heat
- not all eaten / eg of not all eaten
- respiration

  do not accept energy for respiration

2

(d) any **four** from:

- (bodies) consumed by animals / named / scavengers / detritus feeders
- microorganisms / bacteria / fungi / decomposers
- reference to enzymes
- decay / breakdown / decompose / rot
  ignore digest(ion)
- respiration
- carbon dioxide produced
- photosynthesis
- sugar / glucose produced
  accept other organic molecules
- fossilisation / fossil fuels / named
- combustion / burning
  must be linked with fossilisation / fossil fuels
- (burning) produces carbon dioxide
  allow carbon dioxide produced once only

4

[9]

M3. (a) (i) increase / higher / faster / quicker

1

numerical comparison eg from 30 to 60 / by 30 **or** it is 30 at 15°C and 60 at 25°C
*award **2** marks for doubles / goes twice as fast or 30 units more*

1

(ii) any **two** from:

- oxygen / air (in)
  *do **not** accept lets oxygen / air out*
  ignore reference to other substances / light passing in or out ignore microorganisms passing in
- for microorganisms / bacteria / microbes / fungi / decomposers
  ignore worms / germs / bugs
- (for aerobic) respiration
- let heat out
  ignore heat in
- heat kills microorganisms

2

(b) compost contains minerals / nutrients / elements / ions / named

allow improve moisture / drainage
allow nitrogen
ignore CO_2 / food / goodness / fertilisers
*do **not** accept vitamins / glucose etc*

1

[5]

M4. (a) (i) **D**

1

(ii) **A**

1

(b) (i) air / oxygen (can enter)

ignore other factors entering or leaving

1

for (aerobic) respiration

*do **not** accept anaerobic respiration*

1

(ii) (more) minerals / nutrients /salt(s) / ions

or

named mineral / element available

ignore fertility / fertiliser
allow symbols
*allow eg mulching / reducing weeds **or** retain water*

1

[5]

M5. (a) 1.67 / $1\frac{2}{3}$

accept 1.6 to 1.7

ignore working or lack of working $\frac{400 \times 100}{24000}$ *for **1** mark*

2

(b) any **three** from:

deduct only 1 mark for any mention of in carnivore

lost as heat **or** keeping body warm

lost in metabolic functions is not enough

lost in respiration

*do **not** accept 'used for respiration*

movement

not eaten parts or individuals / non-edible parts / dead leaves / wood / bones / faeces / urine

ignore 'waste'

ignore references to growth / reproduction

3

[5]