

GCSE Biology B (Twenty First Century Science)
J257/04 Depth in biology (Higher Tier)

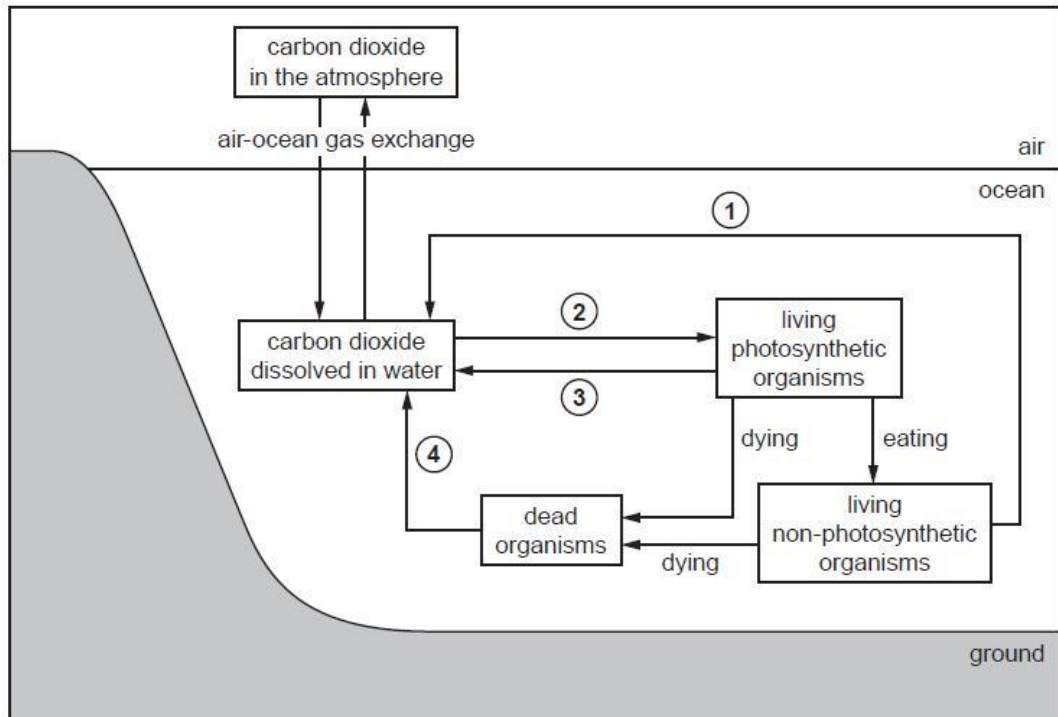
Question Set 3

1

Oceans cover two thirds of the Earth's surface and absorb one third of the carbon dioxide created by human activities.

Oceans play a very important part in cycling carbon.

(a) (i) The diagram shows the parts of the carbon cycle that take place in the ocean.



Write down the names of the processes that have been labelled 1, 2, 3 and 4 in the diagram.

- ① cellular respiration ② photosynthesis
③ cellular respiration ④ decomposition

[3]

(ii) Explain the roles of microorganisms in the ocean carbon cycle shown in the diagram.

Some remove CO_2 from the water when they photosynthesise.
All add CO_2 when they respire.
Some add CO_2 when they decompose dead organisms.

[3]

(iii) The processes shown in the diagram cycle carbon relatively quickly.

Carbon in the ocean is also cycled back to the atmosphere very slowly via another set of processes.

Describe these other processes and explain why this way of cycling carbon is very slow.

Dead organisms become sediment and then are turned into fossil fuels. These fossil fuels are then burnt releasing CO_2 into atmosphere. The formation of fossils takes millions of years.

[2]

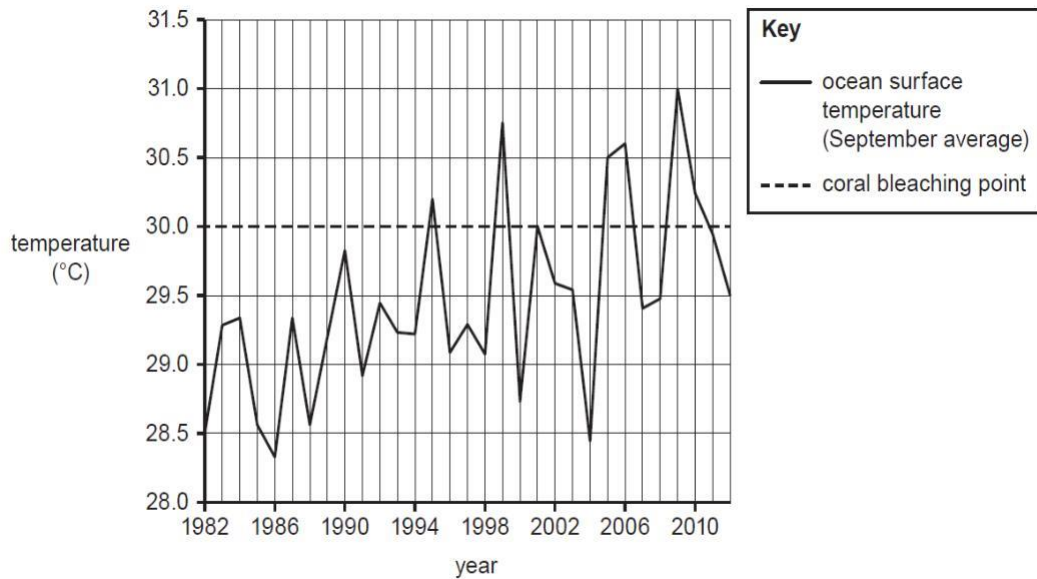
(b)

Human activities are increasing the amount of carbon dioxide in the atmosphere. Carbon dioxide is a greenhouse gas.

Scientists are concerned about the effects that changes in temperature can have on coral reefs in the ocean.

If the ocean temperature rises above 30.0 °C, the coral starts to die and turns white. This temperature is called the 'coral bleaching point'.

The graph shows the ocean surface temperature around the Cayman Islands between 1982 and 2012.



- (i) The graph shows an overall increase in ocean surface temperature from 1982 to 2012.

Describe **two other** patterns that are visible in the ocean surface temperature data on the graph.

Temperature fluctuates between 28.3 and 31.0 °C
Bleaching events are becoming more common.

[2]

- (ii) Scientists say long-term studies are needed when investigating the effects of climate change.

Use evidence from the graph to justify the scientists' view.

A short time study could show no temperature rise.
The overall trend is only visible over many years.

[2]

- (iii) Calculate the **overall rate** of change in the ocean surface temperature from 1982 to 2012.

$$1/30 = \underline{0.03}$$

Overall rate of change = 0.03 °C per year

[2]

- (iv) Predict how the line on the graph may have looked in the five years after 2012, [2]
and explain what this would have meant for coral in the Cayman Islands.

May have continued to fall but then increase in a few years to a peak above the bleaching point.

So more coral, likely to have died
are

Total Marks for Question Set 3: 16



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