

4.2 Carbon Cycling & Climate Change

Question Paper

| | |
|------------|-------------------------------------|
| Course | DP IB Biology |
| Section | 4. Ecology |
| Topic | 4.2 Carbon Cycling & Climate Change |
| Difficulty | Easy |

Time allowed: 50
Score: /39
Percentage: /100

Question 1a

a)

Methane (CH₄) is a simple hydrocarbon gas present in the atmosphere or underground as part of natural gas fossil fuel. A group of single-celled organisms, called archaeans, can produce methane by means of different mechanisms.

State the name of the process by which methane is produced.

[1 mark]

[1 mark]

Question 1b

b)

Archaeans can produce methane in a range of different environments.

List **two** of these environments where methane can be produced.

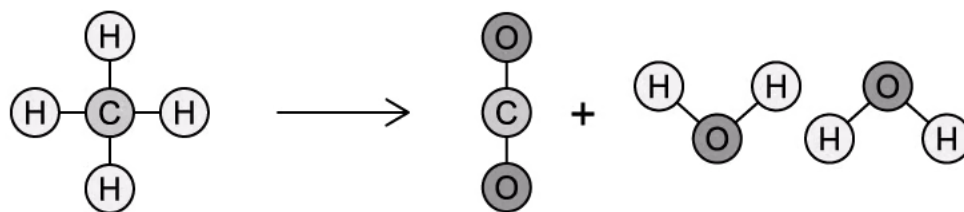
[2 marks]

[2 marks]

Question 1c

c)

When methane is released into the atmosphere, it is involved in the following reaction:



Identify the type of reaction that is illustrated above.

[1 mark]

[1 mark]

Question 1d

d)
Carbon compounds, such as methane, can become trapped in peat which can be burned as fuel.

Briefly describe how peat is formed.

[2 marks]

[2 marks]

Question 2a

a)
Many marine animals, such as mussels and corals, extract carbon from their surroundings to produce hard body parts such as shells.

State the chemical substance that these hard body parts consist of.

[1 mark]

[1 mark]

Question 2b

b)
Describe the process by which the hard body parts of marine organisms, such as molluscs and corals, can become a carbon store.

[2 marks]

[2 marks]

Question 2c

c)

The following table shows the atmospheric carbon dioxide levels over time.

| Year | Carbon dioxide concentration / ppm |
|------|------------------------------------|
| 1960 | 316 |
| 1970 | 325 |
| 1980 | 338 |
| 1990 | 354 |
| 2000 | 369 |
| 2010 | 387 |

Calculate the percentage increase in carbon dioxide concentration between 1960 and 2010. Record your answer to one decimal place.

[2 marks]

[2 marks]

Question 2d

d)

Atmospheric carbon dioxide levels have shown a dramatic increase since the industrial revolution.

State the main reason for this increase.

[1 mark]

[1 mark]

Question 3a

a)

Carbon dioxide is an example of a greenhouse gas.

Define the term 'greenhouse gas'.

[2 marks]

[2 marks]

Question 3b

b)

List **two** other examples of greenhouse gases, other than carbon dioxide.

[2 marks]

[2 marks]

Question 3c

c)

The impact of greenhouse gas in the atmosphere can vary considerably.

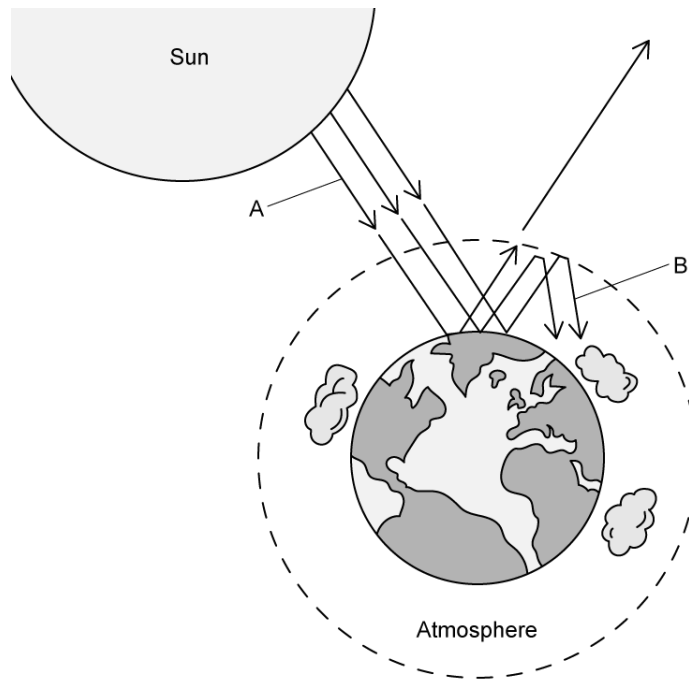
State **two** factors that determine the significance of the impact that a greenhouse gas can have.

[2 marks]

[2 marks]

Question 4a

a)
Study the diagram below.



i)
State the name of the process illustrated by the diagram.

[1 mark]

ii)
Label the type of radiation represented by A and B in the diagram.

[2 marks]

[3 marks]

Question 4b

b)
Greenhouse gases, especially carbon dioxide, have increased in the atmosphere over the past few decades.
State the effect this increase in greenhouse gases will have on global average temperatures.

[1 mark]

[1 mark]

Question 4c

c)
List **two** possible impacts on climate patterns caused by the change in global temperatures described in part (b).

[2 marks]

[2 marks]

Question 5a

One mark is available for clarity of communication throughout this question.

a)
Describe the role of autotrophs within the carbon cycle.

[4 marks]

[4 marks]

Question 5b

b)
There are several processes in the carbon cycle that increase the levels of carbon dioxide in the atmosphere.
List **two** of these processes and state how they increase carbon dioxide levels in the atmosphere.

[4 marks]

[4 marks]

Question 5c

c)
Increased carbon dioxide levels in the atmosphere are having an effect on ocean chemistry.
Outline the way in which atmospheric carbon dioxide affects the pH of oceans and how this change may impact marine organisms.

[7 marks]

[7 marks]

